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NAS CECIL FIELD  
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FINAL PILOT STUDY WORK PLAN FOR SOLAR POWERED LOW VOLUME AIR SPARGING  
TREATMENT CURTAIN AT OPERABLE UNIT 8 (OU 8) NAS CECIL FIELD FL  
10/1/2011  
TETRA TECH



**TETRA TECH**

PITT-10-11-109

October 26, 2011

Project Number 112G00378

BRAC PMO SE

Attn: Mr. Art Sanford

4130 Faber Place Drive

North Charleston, South Carolina 29405

Reference: CLEAN Contract No. N62467-04-D-0055  
Contract Task Order 0025

Subject: Draft Pilot Study Work Plan for Solar Powered Low Volume Air Sparging Treatment  
Curtain at Operable Unit 8, Site 3  
Naval Air Station Cecil Field  
Jacksonville, Florida

Dear Mr. Sanford:

Enclosed please find one copy of the subject deliverable. Copies have been sent to the members of the NAS Cecil Field Partnering Team as noted below. An approval or comment letter is requested upon your review.

If you have any questions, please call me at 412-921-8163 or Megan Boerio at 412-921-7271.

Sincerely,

Robert F. Simcik, P.E.  
Task Order Manager

RFS/clm

Enclosure

cc: D. Vaughn-Wright, U.S. EPA (1 copy)  
D. Grabka, FDEP (1 copy)  
M. Davidson, BRAC PMO SE (electronic copy)  
S. Martin, NAVFAC Atlantic (electronic copy)  
M. Halil, CH2MHill (electronic copy)  
D. Humbert, Tetra Tech (cover letter only)  
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# **C**omprehensive **L**ong-term **E**nvironmental **A**ction **N**avy

CONTRACT NUMBER N62467-04-D-0055



Rev. 0  
10/12/11

## **Pilot Study Work Plan for Solar Powered Low Volume Air Sparging Treatment Curtain at Operable Unit 8 Site 3**

**Naval Air Station Cecil Field  
Jacksonville, Florida**

**Contract Task Order 0025**

**October 2011**



**Southeast**

**2155 Eagle Drive**

**North Charleston, South Carolina 29406**

PILOT STUDY WORK PLAN  
FOR  
SOLAR POWERED LOW VOLUME AIR SPARGING  
TREATMENT CURTAIN  
AT  
OPERABLE UNIT 8  
SITE 3

NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:  
Naval Facilities Engineering Command  
Southeast  
2155 Eagle Drive  
North Charleston, South Carolina 29406

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CONTRACT NUMBER N62467-04-D-0055  
CONTRACT TASK ORDER 0025

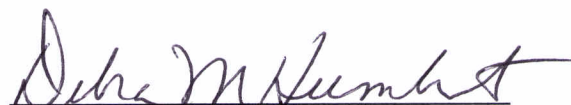
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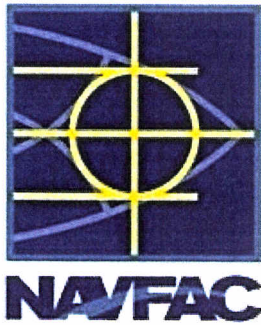


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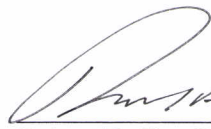
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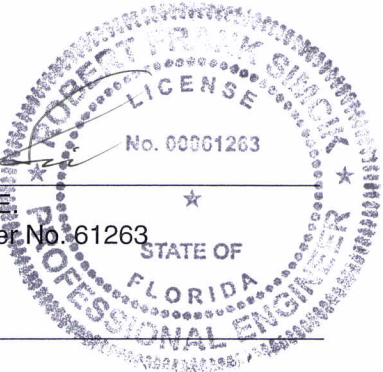
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This document that describes the Pilot Study Work Plan for Solar Powered Low Volume Air Sparging Treatment Curtain for Operable Unit 8, Site 3, at Naval Air Station Cecil Field, Jacksonville, Florida, has been prepared under the direction of a Florida-registered professional engineer. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

  
Robert F. Simcik, P.E.  
Professional Engineer No. 61263

Date: 10/25/11



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## ACRONYMS

|           |   |
|-----------|---|
| AIMD      | Aircraft Intermediate Maintenance Department                          |
| AS        | Air sparging  |
| bgs       | Below ground surface  |
| BOD       | Biochemical oxygen demand   |
| BRAC      | Base Realignment and Closure  |
| CERCLA    | Comprehensive Environmental Response, Compensation, and Liability Act |
| CLEAN     | Comprehensive Long-Term Environmental Action Navy                     |
| COD       | Chemical oxygen demand  |
| CTO       | Contract Task Order   |
| DCE       | Dichloroethene  |
| DO        | Dissolved oxygen  |
| F.A.C.    | Florida Administrative Code   |
| FDEP      | Florida Department of Environmental Protection                        |
| FOL       | Field Operations Leader   |
| FS        | Feasibility Study   |
| GCTL      | Groundwater Cleanup Target Level                                      |
| gpm       | Gallon per minute   |
| ID        | Inside diameter   |
| IDW       | Investigation-derived waste   |
| IR        | Installation Restoration  |
| ITRC      | Interstate Technology & Regulatory Council                            |
| MNA       | Monitored Natural Attenuation   |
| msl       | Mean sea level  |
| NA-DV     | Natural Attenuation Default Value                                     |
| NAPL      | Nonaqueous-phase liquid   |
| NAS       | Naval Air Station   |
| NAVFAC SE | Naval Facilities Engineering Command Southeast                        |
| NGVD      | National Geodetic Vertical Datum                                      |
| ORP       | Oxidation-reduction potential   |
| OU        | Operable Unit   |
| PCE       | Tetrachloroethene   |
| ppm       | Part per million  |
| PVC       | Polyvinyl chloride  |
| QA/QC     | Quality assurance/quality control                                     |
| RI        | Remedial Investigation  |
| ROD       | Record of Decision  |

|          |   |
|----------|---|
| ROI      | Radius of Influence                           |
| SOP      | Standard Operating Procedure                  |
| SVE      | Soil vapor extraction                         |
| SVOC     | Semivolatile organic compound                 |
| TCE      | Trichloroethene                               |
| TOC      | Total organic carbon                          |
| TtNUS    | Tetra Tech NUS, Inc.                          |
| U.S. EPA | United States Environmental Protection Agency |
| VC       | Vinyl chloride                                |
| VOC      | Volatile organic compound                     |



## **1.0 INTRODUCTION**

This Pilot Study Work Plan for Naval Air Station (NAS) Cecil Field, Jacksonville, Florida, has been prepared by Tetra Tech, Inc., (Tetra Tech) for Naval Facilities Engineering Command Southeast (NAVFAC SE) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62467-04-D-0055, Contract Task Order (CTO) 0025. This Work Plan describes a pilot study that will be conducted to determine the effectiveness of solar powered low volume air sparging in reducing groundwater concentrations of chlorinated volatile organic compounds (VOCs) to concentrations that are less than regulatory criteria at Operable Unit 8, Site 3.

### **1.1 SCOPE AND OBJECTIVE**

The objective of the Pilot Study which is detailed in this Work Plan is to determine the effectiveness of using solar powered low volume air sparging technology to reduce the groundwater concentrations of cis-1,2-dichloroethene (cis-1,2-DCE); 1,1-dichloroethene (1,1-DCE); and vinyl chloride (VC) in the Site 3 proposed treatment area. These compounds have been detected at concentrations greater than their Florida Department of Environmental Protection (FDEP) Groundwater Cleanup Target Levels (GCTLs) in this area. Groundwater from the proposed treatment area flows into Rowell Creek, where VC has been observed at concentrations greater than the FDEP GCTL and FDEP Surface Water Cleanup Target Level (SWCTL). The pilot study will be conducted approximately 25 feet inland from the creek along the perpendicular width of the identified chlorinated VOC plume area.

During the Solar Powered Low Volume Air Sparge Pilot Study, ambient air will be injected into the subsurface at Site 3 via air injection wells on an intermittent basis to strip the chlorinated VOCs from the groundwater, and create an aerobic condition which promotes additional degradation prior to the groundwater being discharged into the adjacent creek. The Pilot Study results will be evaluated and the information will be used to determine the effectiveness of this technology, and to assess whether this technology could be an appropriate long-term resolution to the observed surface water exceedances at this site and in other similarly contaminated groundwater plumes.

### **1.2 SITE BACKGROUND**

Site 3, Oil/Sludge Disposal Pit is located in the southwestern portion of the Main Base area of NAS Cecil Field about 3,500 feet west of the east-west runways, as shown on Figure 1-1. Site 3 occupies about 0.5 acres. There are no potable wells in the vicinity of the site that tap the surficial aquifer. A pit on the western side of Site 3 was used to dispose of liquid wastes and sludge from as early as the mid-1950s until 1975. Liquid wastes were taken to the site in bowsters or 55-gallon drums, drained into the pit, and

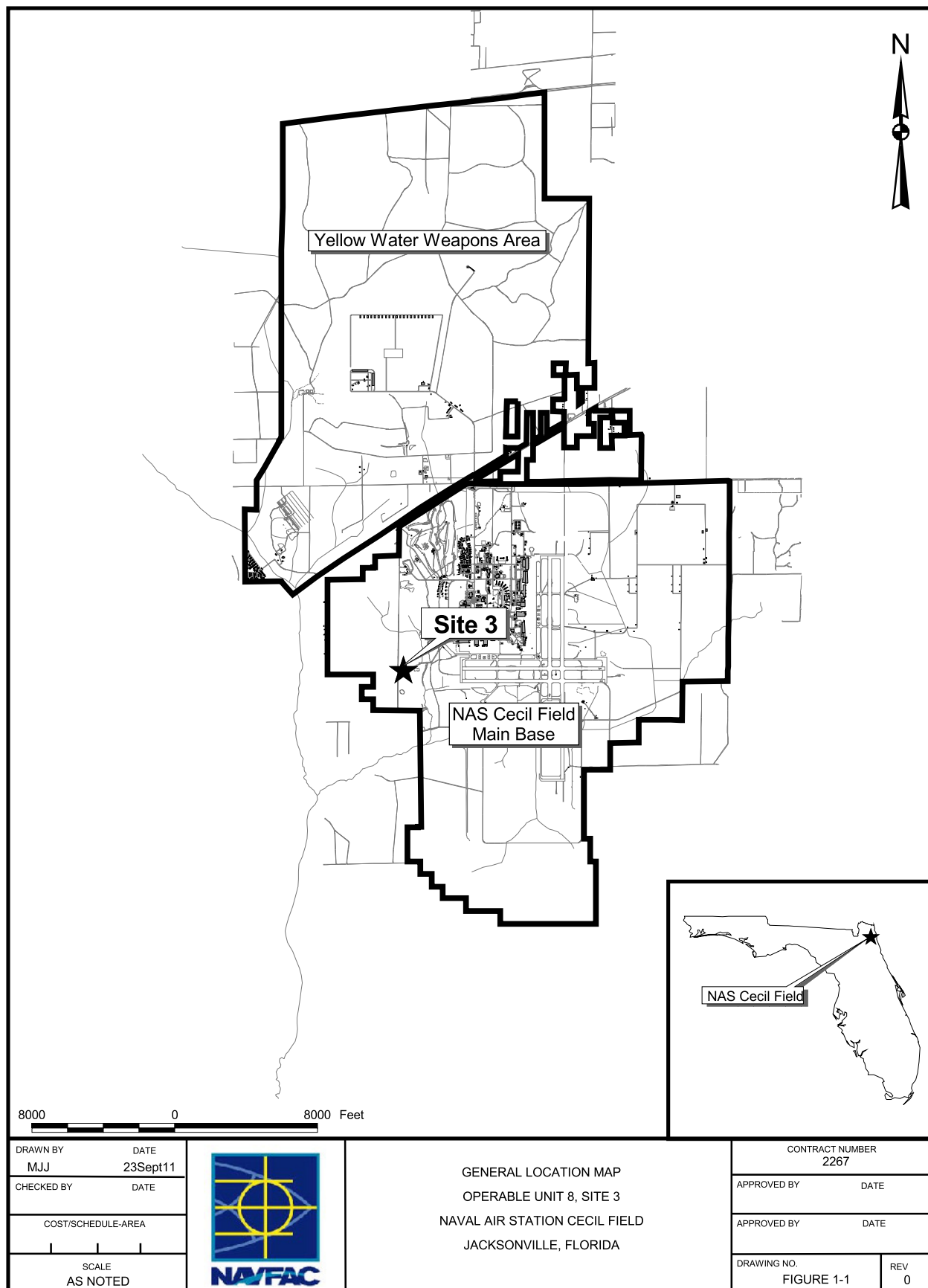
allowed to seep into the soil or evaporate. When the liquid level in the pit neared the ground surface level, the Station's fire department burned the wastes. About 200 to 300 gallons of waste oil, fuel, and tank sludge from the fuel farm were disposed weekly at the site, and a total of approximately 210,000 to 310,000 gallons were disposed throughout the 20-year lifetime of the site. Wastes were generated by the squadrons, Aircraft Intermediate Maintenance Department (AIMD), and the public works department and were composed of fuels, oils, solvents, paint, and paint strippers. Following closure of the site in 1975, the pit was filled and covered with soil. In 1992, a Navy helicopter crashed into a wooded area east of the site. The helicopter had a fuel capacity of between 1,800 and 2,000 gallons and ignited on impact [ABB Environmental Services, Inc. (ABB-ES), 1996].

Site 3 is located near the western perimeter of NAS Cecil Field, in the flight path of landing aircraft. It is a vacant, relatively featureless area with no residential, commercial, or industrial functions. Human activity is generally limited to security patrols or joggers on the Lake Fretwell access road and Perimeter Road. Vegetative cover consists of thick brush and briars. The disposal pit (source area), estimated to be approximately 100 feet in diameter and 3 to 5 feet deep, is located immediately northeast of the intersection of Perimeter Road and the Lake Fretwell access road, both of which are unpaved.

There is a relatively uniform gentle slope toward Rowell Creek and Lake Fretwell over the length of the site. A 6.7-acre wetland is located approximately 800 feet east of the disposal pit, adjacent to Rowell Creek. Rowell Creek is classified by the State of Florida as Class III freshwater. The Pilot Study will be conducted adjacent to Rowell Creek, but will not impact any wetlands.

### **1.3 DOCUMENT ORGANIZATION**

This Work Plan includes site-specific information to be used for the pilot study at Site 3 at NAS Cecil Field. Section 1.0 is the introduction to this Pilot Study Work Plan and describes the scope and objectives, summarizes Site 3 background information, and describes the document organization. Section 2.0 provides baseline conditions in the Pilot Study area including information on the delineation of the groundwater contamination, and geochemical and hydrogeological baseline conditions prior to conducting the pilot study. Section 3.0 provides a summary of the proposed air sparging technology to be evaluated. Section 4.0 describes the Pilot Study design and its various components. Section 5.0 identifies the activities to be conducted for the Pilot Study system installation, start-up, and initial evaluation. Section 6.0 provides information regarding the operation and maintenance of the Pilot Study system. This section also discusses system evaluation and sampling procedures which will be conducted to evaluate and report on the effectiveness of this technology after system startup.



## 2.0 PILOT STUDY BASELINE CONDITIONS

This section provides information regarding the current groundwater contamination at Site 3 that has warranted the need for an action. It also provides information regarding current conditions to aid in the design and evaluation of the proposed Pilot Study system.

### 2.1 GROUNDWATER SAMPLING AND RESULTS

Site 3 is currently undergoing long-term groundwater monitoring (LTM) which implemented in accordance with the approved Uniform Federal Policy (UFP) Sampling and Analysis Plan (SAP) prepared by Tetra Tech (Tetra Tech, 2011). Air sparging was identified in the ROD (Tetra Tech, 1998a) as the active remedial alternative to address source area groundwater contamination, particularly trichloroethene (TCE) and its daughter products. The system successfully achieved the active remedial goals established for this site after approximately 1 year of full operation and 1 year of intermittent operation. The system has not operated since September 2002. The most recent LTM groundwater sampling was the Year 12 annual groundwater monitoring effort conducted in September 2010 by Solutions-IES. The results of this effort were presented in the annual report (Solutions-IES, 2011). The Year 12 LTM report was reviewed by the United States Environmental Protection Agency (EPA) and a Memorandum dated August 11, 2011 was submitted detailing the results of the EPA review (U.S. EPA, 2011). The Memorandum provides a summary of the groundwater conditions at Site 3 and is provided in Attachment 1.

The locations of the monitoring wells currently in the LTM groundwater monitoring program are shown on Figure 2-1. The analytical results which exceeded regulatory criteria during the monitoring effort are presented in the tag map identified as Figure 2-2. The Year 12 Annual Groundwater Monitoring Report documented that VC concentrations in the samples obtained from the Well Point (WP) exceeded the regulatory criteria for two consecutive events. During the September 2009 and September 2010 groundwater sampling events, the detected VC concentrations of 12.9 µg/L and 5.0 µg/L, respectively, exceeded both the FDEP GCTL of 1.0 µg/L and the FDEP SWCTL of 2.4 µg/L. The UFP SAP states that if any chemical of concern (COC) concentration in the surface water/groundwater interface WP is greater than the SWCTL, then the WP will be resampled to verify the exceedance. If the exceedance is verified, then the Base Realignment and Closure (BRAC) Cleanup Team (BCT) shall take appropriate actions to mitigate adverse impacts on Rowell Creek and downgradient receptors.

The results of the Year 12 Annual groundwater monitoring effort were presented to the Cecil Field BCT on November 3, 2010. Based on discussions at this meeting, Tetra Tech was directed to review options to address the observed VC exceedances, and present its findings at the next BCT meeting. Tetra Tech

proposed actions to address the observed FDEP SWCTL exceedances at the February 9, 2011 BCT meeting (BCT, 2011a, Meeting Minute No. 2669). Various alternatives were reviewed including: air sparging, substrate injections, and a recirculation system with aeration or stripping treatment prior to reinjection. Tetra Tech was directed at this meeting (Decision No. 807) to evaluate air sparging as an alternative to address the observed VC exceedances. During the evaluation that followed, Tetra Tech identified that additional data were needed to determine the extent of potential VC discharge into the surface water. Tetra Tech submitted an email on March 25, 2011 detailing additional Well Point sampling to be conducted upstream and downstream of the original well point location with the VC exceedances. Based on the preliminary results of this additional sampling, a subsequent email was sent on April 13, 2011 detailing additional actions to be taken to conduct a vertical evaluation of the contaminant removal capacity of the creek bed sediments. The two emails with their attachments are provided in Attachment 2. The results of the field activities conducted in accordance with these e-mails were presented at the May 11, 2011 BCT meeting. These results confirmed the LTM VC detections in the original Well Point; identified VC exceedances in samples collected 50 feet upstream and 50 downstream of the original WP location; and indicated that the creek sediments were not completely removing all of the VC contamination prior to the groundwater being discharged into the surface water (BCT, 2011b, Meeting Minute No. 2678). The presentation and supporting field paperwork are provided in Attachment 3. Based on this presentation, the BCT directed Tetra Tech to conduct a direct push technology (DPT) investigation (with onsite laboratory analysis) in the area of CEF-003-031S along Rowell Creek to delineate the vertical and horizontal extent of VOC contamination (Decision No. 810).

Tetra Tech conducted the DPT investigation field effort during the week of July 12, 2011. Attachment 4 contains the Work Plan for the sampling effort, a summary of the field effort, analytical results tag maps, the results summary table, and field paperwork backup information. The results were presented at the August 16, 2011 BCT meeting. These results demonstrated that the VC contamination is limited to a relatively small area (25 feet in length: 12.5 feet upstream and 12.5 feet downstream) centered on the original well CEF-003-031S; however, cis-1,2-DCE and 1,1-DCE concentrations were elevated across a more significant area (approximately 180 feet in length centered on the original well location). It appears that these groundwater contaminants are degrading to VC as they approach the discharge points at the creek (WP sample locations) as identified on Figures 2-4 and 2-5.

## **2.2 GEOCHEMICAL PARAMETERS**

The geochemical data which were collected during the LTM program sampling include: dissolved oxygen (DO), pH, oxidation-reduction potential (ORP), and conductivity. These data provide useful information about current conditions which will aid in determining if the proposed air sparging technology is appropriate, and provide a baseline for geochemical conditions prior to system operation. The area of interest for this Pilot Study is located near monitoring well CEF-003-031S and the temporary well point

(WP#2); results from previous LTM events at these locations are summarized in Tables 2-1 and 2-2. The data indicate that there is an anaerobic aquifer in the proposed treatment area that becomes aerobic at the Well Point location immediately adjacent to the creek. This conclusion is based primarily on the averages of the DO and ORP medians obtained during the events conducted since July 2007: a DO of 0.7 mg/L and ORP of -117.2 mV in the monitoring well, and a DO of 3.4 mg/l and ORP of -56.8 mV in the Well Point. Generally DO concentrations of less than 1.0 mg/L indicate anaerobic conditions; and ORP ranges from 200 mV in aerobic oxidizing conditions to -400 mV in strongly anaerobic reducing conditions.

Additional geochemical parameter data which were collected during the July 2011 DPT investigation from the proposed treatment area provide similar results to those obtained during the LTM effort. The information collected during the DPT effort is summarized in the results table provided in Attachment 4. The average median values for DO and ORP in the twelve sampling locations along the proposed treatment area from the same sample interval as the monitoring well (20 to 30 feet below land surface) are 0.4 mg/L and 14 mV, respectively.

Air stripping of the contaminants of concern (cis-1,2-DCE and 1,1-DCE) will be the primary treatment process in the area of the proposed treatment system. Both of these contaminants appear to be reducing to VC in passing from the proposed treatment area to the creek discharge point. This is made evident by the DC exceedances shown on Figure 2-5 in the DPT results corresponding with few VC exceedances, and then the VC exceedance detected in the creek during the well point sapling conducted in April 2011 with none of the parent products (in particular, TCE) were observed. The proposed air sparge treatment system will create an aerobic condition in the treatment area; however, upgradient of the treatment area, conditions will remain anaerobic to promote the continued degradation of residual TCE and some of its daughter products. Although stripping of the contaminants will be the primary mechanism for removal of contamination, the increased residual time in an aerobic condition will enable further degradation, if needed, of these contaminants (1,1-DCE, cis-1,2-DCE, and VC) prior to groundwater discharge to the surface water.

## **2.3 HYDROGEOLOGY**

Groundwater elevation data from LTM reports indicate that groundwater flow at Site 3 is to the east in the direction of Rowell Creek, as shown on Figure 2-3. The average hydraulic gradient at Site 3 varies from the source area to the discharge point into Rowell Creek. The average horizontal gradient in the surficial aquifer measured along the flow path from the waste disposal pit area (CEF-003-03S) to Rowell Creek (CEF-003-20S) during the Remedial Investigation (RI) in March through September 1994 was approximately 0.016 feet/feet (ft/ft). The gradients increase as the groundwater approaches Rowell Creek. The source area gradient is relatively flat with a gradient of 0.005 ft/ft and the gradient in the last 300 feet before Rowell creek is approximately 0.035 ft/ft. Testing during the RI identified a hydraulic

conductivity of 7.5 ft/day and an effective porosity of 0.20, providing a seepage velocity of 88 feet per year; the rate increases toward Rowell Creek where the seepage velocity is approximately 190 feet per year. Detailed information is provided in the Remedial Investigation for Operable Unit 8, Site 3 (ABB-ES, 1996).

Overburden geology of Site 3 consists of fine to very fine sand with varying amounts of silt. A continuous clay layer is located at a depth approximately 46 feet to 50 feet below land surface. Boring logs from the proposed treatment area are presented in the Work Plan contained in Attachment 4. Isolated, discontinuous, relatively thin clay layers may be present, but are not expected to significantly impact the proposed air sparging treatment technology.

TABLE 2-1

**SUMMARY OF GEOCHEMICAL DATA  
MONITORING WELL CEF-003-31S  
SITE 3, NAS CECIL FIELD, JACKSONVILLE, FLORIDA**

| Sample ID       | Sample Date | Contractor    | D.O.<br>(mg/L) | pH<br>(standard<br>units) | ORP<br>(mV)   | COND.<br>(uS/cm) | Vinyl Chloride<br>(ug/L) |   |
|-----------------|-------------|---------------|----------------|---------------------------|---------------|------------------|--------------------------|---|
| CEF-003-31S     | Sep-10      | Solutions-IES | 0.2            | 6.74                      | -358.8        | 237              | 10.9                     |   |
| CEF-003-31S     | Sep-09      | Solutions-IES | 1              | 6.37                      | -18.9         | 255              | 13.3                     |   |
| CEF-003-31S     | Oct-08      | Solutions-IES | 1              | 6.3                       | 26.1          | *                | 5                        |   |
| CEF-003-31S     | Jan-07      | Ellis         | <1             | 6.46                      | -38           | 390              | 6                        |   |
| CEF-003-31S     | Jul-06      | Ellis         | 1.5            | 6.59                      | 430           | 1411             | 2.6                      |   |
| CEF-003-31S     | Jan-06      | Ellis         | <1             | 6.71                      | -159.5        | 330              | 2.1                      |   |
| CEF-003-31S     | Jul-05      | Ellis         | 0.37           | 6.45                      | 93            | 326              | 5.7                      |   |
| CEF-003-31S     | Jan-05      | Ellis         | 0.33           | 6.64                      | 285           | 314              | 3.2                      |   |
| CEF-003-31S     | Jul-04      | Ellis         | 2              | 6.41                      | -87           | 330              | 5.8                      |   |
| CEF-003-31S     | Jan-04      | Ellis         | 1              | 7.02                      | -33           | 285              | 7.9                      |   |
| CEF-003-31S     | Jul-03      | Ellis         | 0.46           | 6.79                      | -83.9         | 315              | 5.2                      |   |
| CEF-003-31S     | Feb-03      | Ellis         | 0.2            | 6.86                      | -131.9        | 311              | 1.8                      |   |
| CEF-003-31S     | Jul-02      | Ellis         | 0.3            | 6.86                      | -164          | 334              | 4.3                      | J |
| CEF-003-31S     | Jan-02      | Ellis         | 1              | 7.1                       | -77           | 325              | 0.55                     | J |
| CEF-003-31S     | Jul-01      | Ellis         | 1              | 6.74                      | -35           | 320              | 2                        |   |
| CEF-003-31S     | Jan-01      | Ellis         | 0.4            | 6.83                      | -134          | 282              | 2.1                      |   |
| CEF-003-31S     | Oct-00      | Ellis         | 0.6            | 7.02                      | -110          | 358              | 1.4                      |   |
| CEF-003-31S     | Jul-00      | Ellis         | 0.2            | 6.86                      | -140          | 340              | 1                        | U |
| CEF-003-31S     | Apr-00      | Ellis         | 0.2            | 6.99                      | -143          | 332              | 2                        | U |
| CEF-003-31S     | Feb-00      | Ellis         | 1              | 6.94                      | 0             | *                | 1                        | U |
| CEF-003-31S     | Nov-99      | Ellis         | 0.6            | 6.92                      | -75           | 335              | 1                        | U |
| CEF-003-31S     | Aug-99      | Ellis         | 0.3            | 6.9                       | <-55          | 226              | 3.8                      |   |
| CEF-003-31S     | May-99      | Ellis         | 0.97           | 7.15                      | -123.9        | 323              | 1.1                      |   |
| CEF-003-31S     | Feb-99      | Ellis         | 0.6            | 7                         | -129.1        | 321              | 1                        | U |
| CEF-003-31S     | Dec-98      | Ellis         | 0.71           | 6.72                      | -120.4        | 310              | 0.9                      | J |
| <b>AVERAGES</b> |             |               | <b>0.7</b>     | <b>6.5</b>                | <b>-117.2</b> | <b>246.0</b>     | <b>7.8</b>               |   |
| <b>STD DEV</b>  |             |               | <b>0.5</b>     | <b>0.2</b>                | <b>210.4</b>  | <b>12.7</b>      | <b>5.2</b>               |   |
| <b>MEDIAN</b>   |             |               | <b>1.0</b>     | <b>6.4</b>                | <b>-18.9</b>  | <b>246.0</b>     | <b>8.0</b>               |   |
| <b>MAX</b>      |             |               | <b>1.0</b>     | <b>6.7</b>                | <b>26.1</b>   | <b>255.0</b>     | <b>13.3</b>              |   |
| <b>MIN</b>      |             |               | <b>0.2</b>     | <b>6.3</b>                | <b>-358.8</b> | <b>237.0</b>     | <b>2.0</b>               |   |

\* Anomalous readings were removed to enable realistic statistical calculations.

NR - Not Recorded

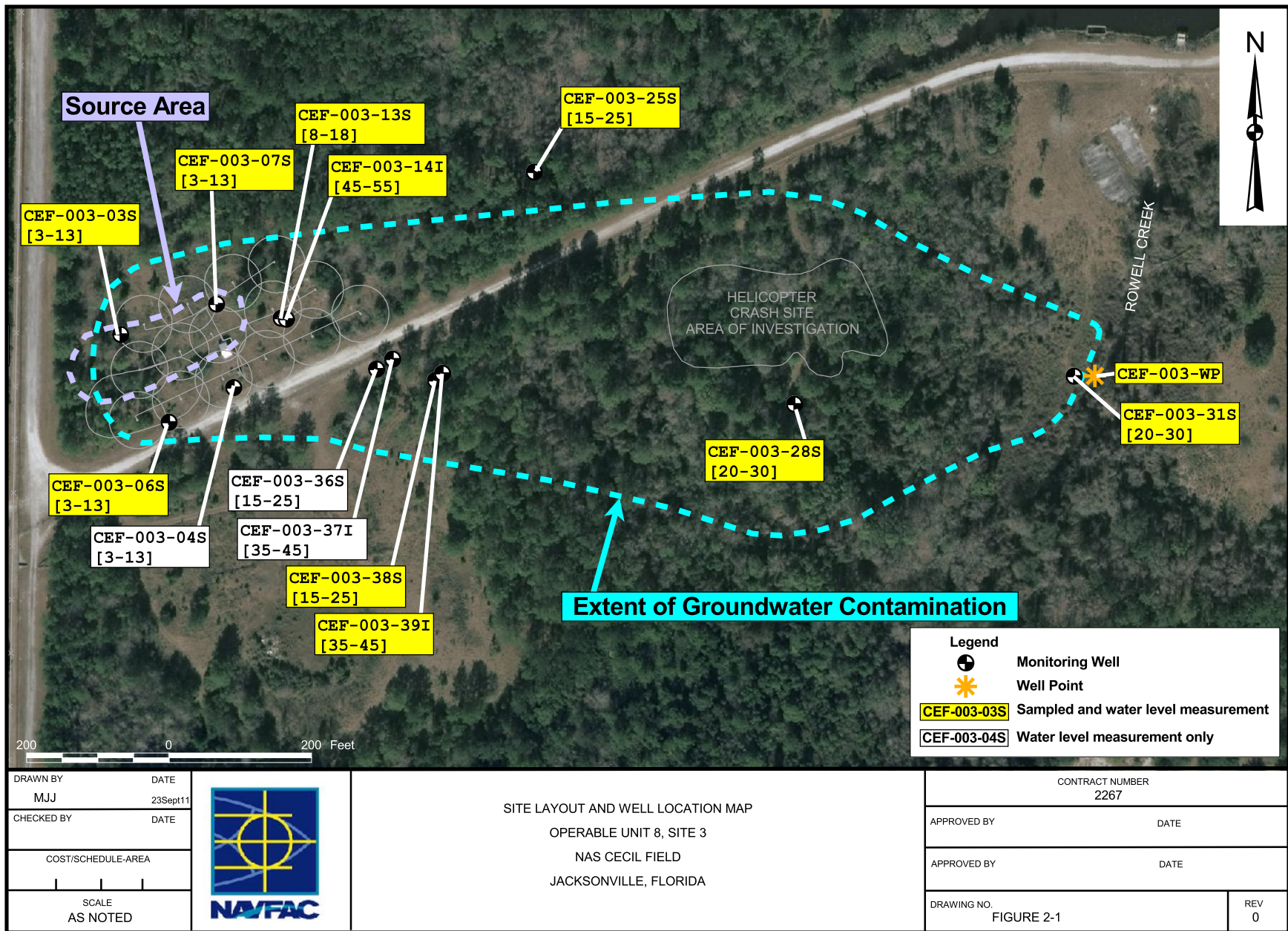


**TABLE 2-2**  
**SUMMARY OF GEOCHEMICAL DATA**  
**WELL POINT**  
**SITE 3, NAS CECIL FIELD, JACKSONVILLE, FLORIDA**

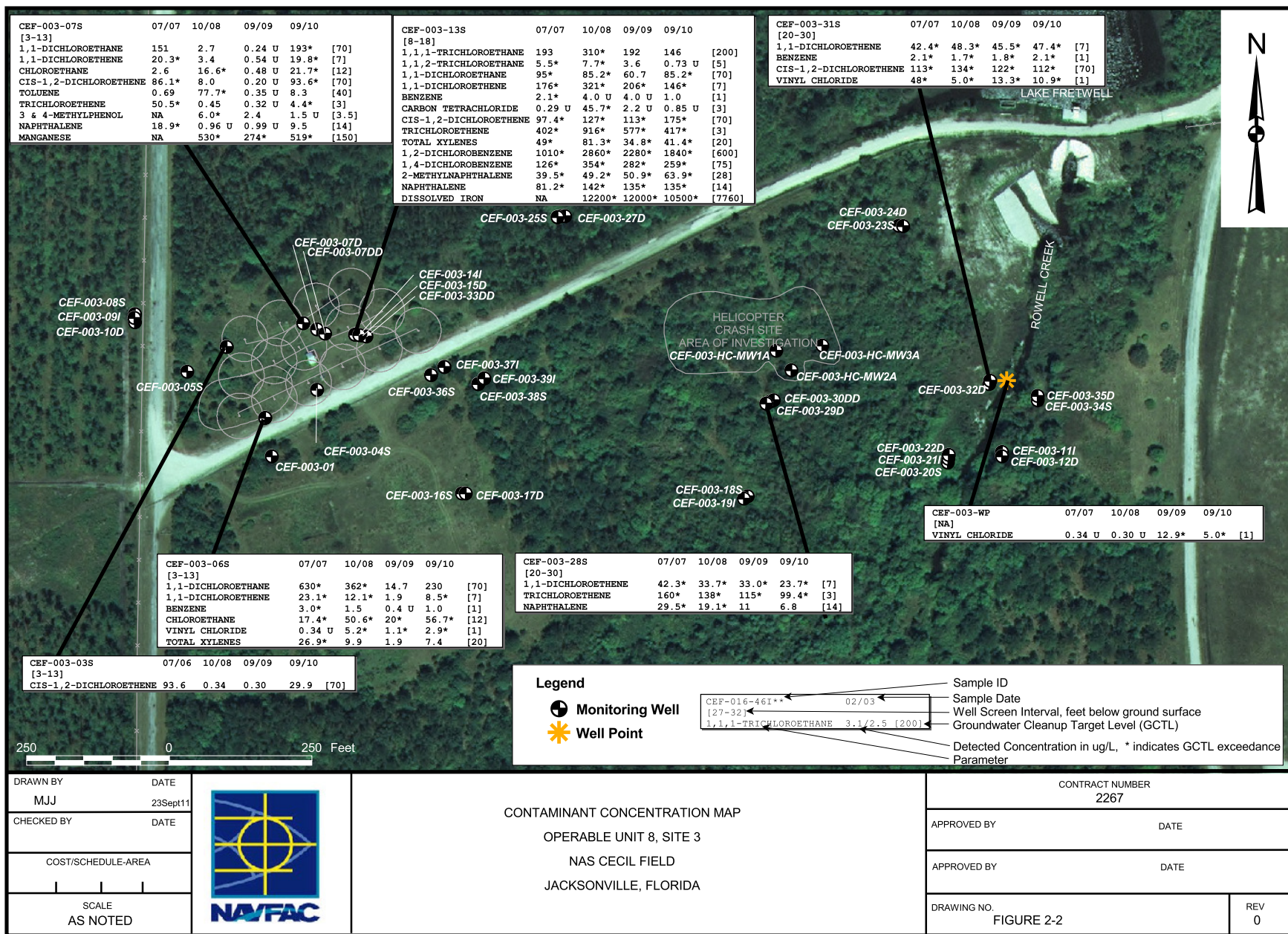
| Sample ID      | Contractor    | Sample Date | D.O.<br>(mg/L) | pH<br>(standard units) | ORP<br>(mV)   | COND.<br>(uS/cm) | Vinyl Chloride<br>(ug/L) |   |
|----------------|---------------|-------------|----------------|------------------------|---------------|------------------|--------------------------|---|
| CEF-003-WP     | Solutions-IES | Sep-10      | 0.4            | 6.57                   | -305.1        | 217              | 5                        |   |
| CEF-003-WP     | Solutions-IES | Sep-09      | 2              | 6.16                   | 21.7          | 350              | 12.9                     |   |
| CEF-003-WP     | Solutions-IES | Oct-08      | 7              | 6.18                   | 28.3          | 110              | <0.3                     |   |
| CEF-003-WP     | Solutions-IES | Jul-07      | 4              | 6.3                    | 28            | 150              | <0.34                    |   |
| CEF-003-WP     | Ellis         | Jan-07      | 4              | 6.77                   | 9             | 230              | 0.5                      | U |
| CEF-003-WP     | Ellis         | Jul-06      | <1             | 6.45                   | -30.8         | 312              | 5.9                      |   |
| CEF-003-WP     | Ellis         | Jan-06      | 8              | 6.45                   | 27            | 93               | 0.5                      | U |
| CEF-003-WP     | Ellis         | Jul-05      | 3.37           | 6.19                   | 153           | 67               | 0.5                      | U |
| CEF-003-WP     | Ellis         | Jan-05      | 8.29           | 6.71                   | 283           | 130              | 0.54                     | J |
| CEF-003-WP     | Ellis         | Jul-04      | 5              | 6.58                   | -21           | 150              | 1                        | U |
| CEF-003-WP     | Ellis         | Jan-04      | 6              | 7.09                   | 109           | 130              | 1                        | U |
| CEF-003-WP     | Ellis         | Jul-03      | 2.23           | 6.28                   | -4.3          | 107              | 1                        | U |
| CEF-003-WP     | Ellis         | Feb-03      | 6              | 6.42                   | 117           | 122              | 1                        | U |
| CEF-003-WP     | Ellis         | Jul-02      | 1              | 6.18                   | -154          | 271              | 2                        |   |
| CEF-003-WP     | Ellis         | Jan-02      | 8              | 6.92                   | 86            | 64               | 1                        | U |
| CEF-003-WP     | Ellis         | Jul-01      | 5              | 6.27                   | 107           | 83               | 1                        | U |
| CEF-003-WP     | Ellis         | Jan-01      | 8              | 6.66                   | 62            | 140              | 1                        | U |
| CEF-003-WP     | Ellis         | Oct-00      | 0.8            | 6.25                   | -114          | 323              | 38.5                     |   |
| CEF-003-WP     | Ellis         | Jul-00      | 1              | 4.97                   | -164          | 95               | 6.7                      |   |
| CEF-003-WP     | Ellis         | Apr-00      | 7              | 6.89                   | 96            | *                | 1                        | U |
| CEF-003-WP     | Ellis         | Feb-00      | 1              | 6.32                   | -124          | *                | 2.9                      |   |
| CEF-003-WP     | Ellis         | Nov-99      | 3              | 6.51                   | 2             | 139              | 1                        | U |
| CEF-003-WP     | Ellis         | Aug-99      | 1.5            | 6.38                   | -10           | 112              | 1                        | U |
| CEF-003-WP     | Ellis         | May-99      | 5.44           | 6.84                   | 18            | 272              | 1                        | U |
| CEF-003-WP     | Ellis         | Feb-99      | 0.455          | 6.67                   | -166.8        | 303              | 7.7                      |   |
| CEF-003-WP     | Ellis         | Dec-98      | 0              | 6.43                   | -104.9        | 326              | 1.9                      |   |
| <b>AVERAGE</b> |               |             | <b>3.4</b>     | <b>6.3</b>             | <b>-56.8</b>  | <b>206.8</b>     | <b>4.6</b>               |   |
| <b>STD DEV</b> |               |             | <b>2.8</b>     | <b>0.2</b>             | <b>165.6</b>  | <b>105.2</b>     | <b>5.9</b>               |   |
| <b>MEDIAN</b>  |               |             | <b>3.0</b>     | <b>6.2</b>             | <b>24.9</b>   | <b>183.5</b>     | <b>2.7</b>               |   |
| <b>MAX</b>     |               |             | <b>7.0</b>     | <b>6.6</b>             | <b>28.3</b>   | <b>350.0</b>     | <b>12.9</b>              |   |
| <b>MIN</b>     |               |             | <b>0.4</b>     | <b>6.2</b>             | <b>-305.1</b> | <b>110.0</b>     | <b>0.3</b>               |   |

\* Anomalous readings were removed to enable realistic statistical calculations.

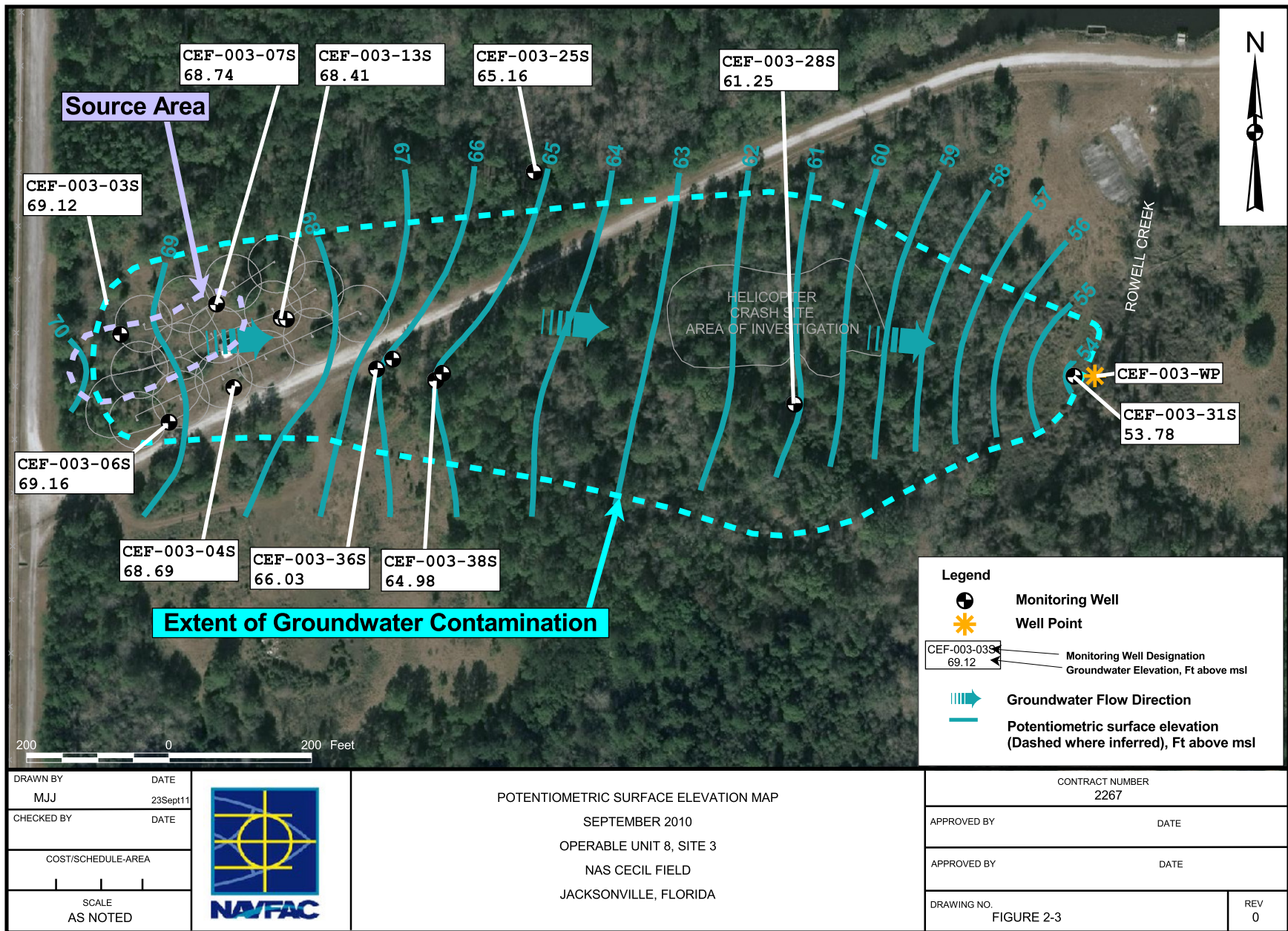
NR - Not Recorded

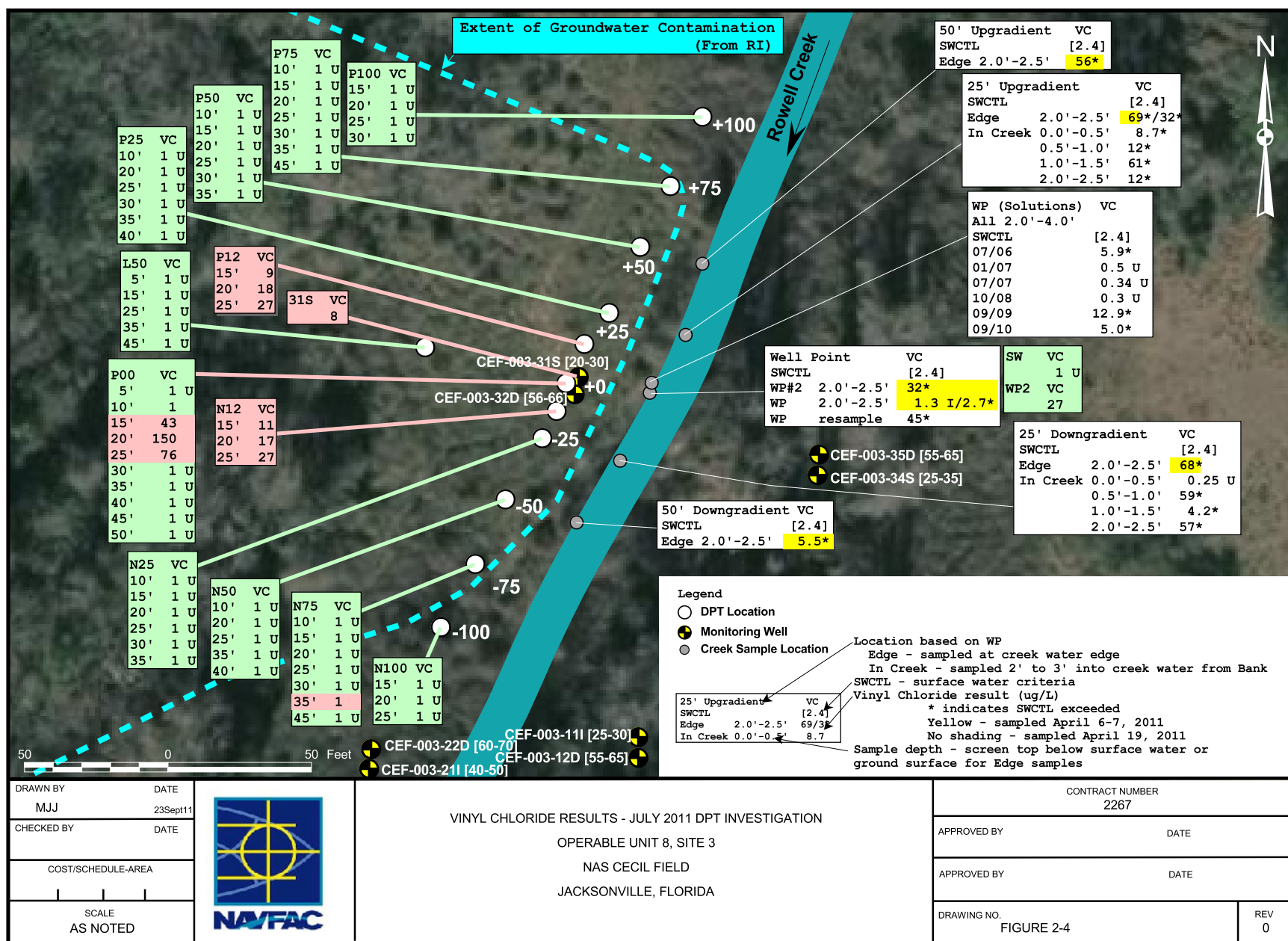














### 3.0 AIR SPARGING

This section provides a brief summary of the air sparging technology proposed for the pilot study.

#### 3.1 APPLICATION

Air sparging is an in situ remedial technology that reduces concentrations of volatile constituents via volatilization and anaerobic biological processes. This technology, which is also known as "in situ air stripping" and "in situ volatilization," involves the injection of contaminant-free air into the subsurface saturated zone, enabling a phase transfer of volatile compounds from a dissolved state to a vapor phase. The air is then vented through the unsaturated zone.

When used appropriately, air sparging has been found to be effective in reducing concentrations of VOCs. An air sparging system can use either vertical or horizontal sparge wells. Well orientation should be based on site-specific needs and conditions.

Air sparging should not be used if the following site conditions exist:

- Free product is present. Air sparging can create groundwater mounding which could potentially cause free product to migrate and contamination to spread.
- Nearby basements, sewers, or other subsurface confined spaces are present at the site. Potentially dangerous constituent concentrations could accumulate in basements unless a vapor extraction system is used to control vapor migration.
- Contaminated groundwater is located in a confined aquifer system. Air sparging cannot be used to treat groundwater in a confined aquifer because the injected air would be trapped by the saturated confining layer and could not escape to the unsaturated zone.
- Significant volatilization of COCs would result in air permit exceedances (or would require the use of a vapor extraction system added to the air sparge system).

The conditions that exist in the downgradient plume area of Site 3, discussed in Section 2, are appropriate for the use of air sparging as a remedial technology.



### **3.2 OPERATION PRINCIPLES**

The effectiveness of air sparging depends primarily on two factors:

1. Vapor/dissolved phase partitioning of the constituents determines the equilibrium distribution of a constituent between the dissolved phase and the vapor phase. Vapor/dissolved phase partitioning is, therefore, a significant factor in determining the rate at which dissolved constituents can be transferred to the vapor phase.
2. Permeability of the soil determines the rate and pressure at which air can be injected into the saturated zone. It is the other significant factor in determining the mass transfer rate of the constituents from the dissolved phase to the vapor phase.

In general, air sparging is more effective for constituents with greater Henry's constant volatility and lower solubility, and for soils with higher permeability. The rate at which the constituent mass will be removed decreases as air sparging operations proceed and concentrations of dissolved constituents are reduced.

Stratified or highly variable heterogeneous soils typically create the greatest obstacles to air sparging. Both the injected air and the stripped vapors will travel along the paths of least resistance (coarse-grained zones), and could travel a great lateral distance from the injection point. This phenomenon could result in the contaminant-laden sparge vapors migrating outside the vapor extraction control area.

The contamination and subsurface soil conditions in the area of the proposed pilot study are appropriate for this application.

### **3.3 SYSTEM DESIGN DISCUSSION**

The essential goals in designing an air sparging system are to configure the wells and monitoring points in such a way to:

1. Optimize the influence on the plume, thereby maximizing the removal efficiency of the system.
2. Provide optimum monitoring and vapor extraction points to ensure minimal migration of the vapor plume, and no undetected migration of either the dissolved phase or vapor phase plumes. In shallow applications, in large plume areas, or in locations under buildings or pavements, horizontal vapor extraction wells are very cost effective and efficient for controlling vapor migration.

Field pilot studies are often necessary to adequately design and evaluate air sparging systems.



None of the site conditions detailed in Section 3.1 which would prevent the use of air sparging technology exist at Site 3. Soil vapor extraction will not be required at Site 3 due to the relatively low concentrations of the COCs that will be volatilized. The emphasis of the proposed Pilot Study is unique because it will be conducted over the entire length of the treatment area. The performance of the air sparging system will be evaluated to determine its effectiveness, and to assess whether it could be used as a long-term or permanent solution at this Site.

The placement and number of air sparge points required to address the dissolved phase plume is determined primarily by the permeability and structure of the soil, as these affect the sparging pressure and distribution of air in the saturated zone. Coarse-grained soils (e.g., sand, gravel) have greater intrinsic permeability than fine-grained soils (e.g., clay, silt), and are more amenable to air movement (and water) through more permeable soil. Greater lateral dispersion of the air is likely in fine-grained soils and can result in lateral displacement of the groundwater and contaminants if groundwater control is not maintained.

The radius of influence (ROI) for air sparging wells is defined as the greatest distance from a sparging well at which sufficient sparge pressure and airflow can be induced to enhance the mass transfer of contaminants from the dissolved phase to the vapor phase. The ROI is an important parameter to be considered in the design of the air sparging system. The ROI will help determine the number and spacing of the sparging wells. Air sparging wells should be placed so that the overlap of their ROIs completely covers the area of contamination.

The sparging air flow rate required to provide sufficient air flow to enhance mass transfer is site-specific. The proposed Solar Powered Air Sparge System will be operated on an intermittent alternating basis; therefore, each area (as determined by the observed ROI of each individual well) will have active air sparging conducted for only a portion of each day of operation at what can be considered a low air flow rate of 3 cubic feet per minute (cfm).

## 4.0 PILOT STUDY DESIGN

This section describes the general design of the Pilot Study. In this pilot study, an air sparging curtain will be installed. The pilot test data will be used to determine if this technology can feasibly intercept and treat the dissolved VOC plume in order to prevent contamination from discharging into Rowell Creek. The proposed air sparging curtain will be solar powered and the air flow will be pulsed (alternating air flow) on a non-continuous basis. This is a somewhat unique application, and thus warrants conducting this pilot study.

### 4.1 AIR SPARGING SYSTEM LAYOUT

Figure 4-1 shows the pilot study area and the proposed air sparging curtain which will be located approximately 25 feet from and parallel to Rowell Creek. The air sparging curtain will be approximately 200 feet long, and will span the entire perpendicular width of the dissolved VOC plume. The air sparging curtain will consist of nine sparge wells spaced approximately 25 feet apart.

#### 4.1.1 Sparging Curtain Length, Well Spacing, and Air Flow Rates

The latest DPT investigation identified the width of the VOC plume immediately upgradient of Rowell Creek to be approximately 150 to 180 feet; therefore, the length of the air sparge curtain will be approximately 200 feet to completely intercept and treat the perpendicular width VOC plume.

One of the main design considerations is the spacing between the air injection wells within the sparge curtain. Previous work at this facility has demonstrated that the air sparging ROI can be significant. For example, a 50-foot radius of influence was reported at 3 standard cubic feet per minute (SCFM) of injection air flow during the pilot test at Site 5 (ABB-ES, 1997b). Furthermore, the source area treatment at Site 3 used an air sparge well spacing of 70 feet to successfully achieve the established remedial action objectives for the source area within the anticipated time frame.

An effective air sparge curtain is usually designed with a relatively close spacing between the injection wells to provide a reliable one-pass treatment of groundwater. The dimensions of the ROI cone depend on the angle of distribution of air and the depth of injection. The angle of distribution depends on the formation air permeability and injection air flow. The typical range of angle distribution usually varies between 15 degrees for coarse gravels to 60 degrees for fine silty sands (Nyer, 1998).

The pilot area geology is represented mostly by sands and fine sands; therefore, a relatively large angle of distribution can be expected. Assuming (conservatively) 40 degrees as a minimum angle of

distribution, the design ROI (for a 40 degree distribution angle and 45 foot injection depth) would be approximately 16 feet. It is recommended to space the injection wells at approximately 25 feet apart to achieve a good overlap between the injection wells ROI zones. A total of nine injection wells will be required with the selected spacing. The design ROI (15 feet) and the selected well spacing (25 feet) would allow for approximately 7 feet of ROI overlap. Refer to Figure 4-1 for the air sparging curtain layout.

The injection air flow rate was selected based on various papers on this topic including Suthersan's (1999), and also on the flow rate that was used successfully for the Site 3 source area treatment system which was an average of approximately 3 SCFM. Therefore, a minimum of 3 SCFM of air flow will be used per sparging well in the sparging curtain at Site 3. Based on 45 feet of injection depth and a very shallow water table, the required injection pressure is expected to be approximately 20 pounds per square inch, gauge (psig).

#### **4.1.2      Solar Power and Pulsed Operation**

The pilot test area at Site 3 is located in a remote location far from existing power sources. It would be costly to install a long power line to the pilot test location. Consideration was given to green and sustainable technologies in the selection of a power service. After review of the various options, the Cecil Field BCT decided to utilize solar power for the air sparging system operation (BCT, 2011c, Meeting Minute No. 2691; Decision No. 817). The use of solar power has created some unique design challenges and placed certain restrictions on equipment and operation for the sparging system.

In general, energy consumption to produce compressed air is fairly high because compressed air temperature rises as a result of compression. If all nine air sparging wells were required to operate at the same time on a 24-hour basis (3 SCFM at 20 psig per injection well), the resulting solar array required would be approximately 1,000 square feet at a total cost of \$250,000 to \$500,000; however, continuous operation is not being proposed for this pilot test.

It is believed that continuous air sparging is not necessary for effective VOC removal, and that a pulsed operation can be utilized when the air flow is rotated between groups of sparge wells. In fact, both laboratory studies and operational experience suggest that a pulsed operation can deliver higher removal rates of dissolved VOCs compared to a continuous operation. This is based on the evidence that the VOC volatilization rates dramatically decrease after the air sparging system reaches steady-state conditions (Yang, 2005). A pulsed air sparging operation is documented to be more effective (as compared to a continuous operation) in the NAVFAC Air Sparging Guidance Document (Batelle, 2001). In fact, the NAVFAC guidance document specifically mentions that a pulsed operation may be necessary for air sparging curtain applications: "*Pulsed operation may be necessary in sparge barrier applications to*

*prevent groundwater bypassing due to water permeability reductions in the formation caused by air injection.”*

Therefore, a pulsed operation will be implemented for the NAS Cecil Site 3 air sparging curtain in order to both increase the sparging curtain effectiveness, and at the same time significantly reduce the size and cost of solar arrays. This pulsed operation will be implemented as follows:

- Air sparging wells will be combined in three groups of three wells per group (Figure 4-1).
- Air flow will be rotated between three wells within each group such that each well is operated approximately one third of the time.
- Rotation time between the wells will be determined by the time it takes for the injected air channels to develop (steady-state conditions manifested by constant air flow and pressure), while also taking into consideration the total time the system can operate each day.
- It is expected that the rotation time between the wells will range from ½ hour to 2 hours. However, the actual rotation time will be determined and optimized in the field.

## **4.2 PROCESS EQUIPMENT**

The air sparging system will have three identical equipment modules. Each equipment module will have the following components:

1. Air sparging wells (three wells per equipment module, nine wells total).
2. Air compressor to deliver at least 3 SCFM of air at 20 psig.
3. Solar array with all necessary power components (battery pack, DC-AC inverter, etc.) capable of powering the air compressor during daylight hours (6 to 9 hours per day depending on the season).
4. Controls and instrumentation for system operation (solenoid valves, timing relays, flow meters, valves, gauges, etc.).
5. Compressed air lines from air compressor to air sparging wells.

The air sparging system components, instrumentation, and safety interlocks are shown on the piping and instrumentation diagram (P&ID) (Figure 4-2). The equipment manufacturer's information is presented in

Attachment 5. The information about the selected equipment items is summarized in Table 4-1. The descriptions of the key equipment items are included in the following sections.

#### **4.2.1      Sparging Wells**

A total of nine air sparging wells will be installed as shown on Figure 4-1. The air sparging wells will be installed to a depth of approximately 45 feet below grade surface. The wells will be constructed using ¾ -inch polyvinyl chloride (PVC) Schedule 40 solid casing with the 2-foot screened section installed at the bottom (#10-inch slot screen). The wells will be installed using a pre-packed filter sand around the screened section and a bentonite seal around the solid casing portion (1½" pre-packed filter sand and seal column). If available, a 40 micron SCHUMASOIL screen will be used. A 2-foot fine sand seal will be placed above the well screen, and grout slurry will be installed around the solid casing portion to seal the bore hole. A 12-inch diameter by 12-inch protective well head vault will be installed along with a 3-foot by 3-foot concrete pad to complete the system well installation. The cross section of a proposed air sparge well is shown on Figure 4-4.

#### **4.2.2      Air Compressor**

The air compressor for this application had to be selected very carefully in order to minimize the power consumption while delivering the required air flow at the specified discharge pressure (at least 3 SCFM at 20 psig). The optimum air compressor currently available for this application is an oil-free rocking-piston type air compressor. The selected air compressor (Thomas Gardner Model 2660CE37, 1/3 hp, 115VAC or similar) delivers 3.28 SCFM air flow at 20 psig with 40 psig maximum pressure. Based on the manufacturer's test data (Attachment 6) this air compressor requires 390 watts of power to produce 3.28 SCFM of air flow at 20 psig.

The air compressor with electrical controls and instrumentation will be housed in a small pre-fabricated rain-tight ventilated equipment cabinet as shown on Figure 4-3. The equipment cabinet dimensions will be approximately 2 feet wide by 2 feet deep by 4 feet high. The construction details for the equipment cabinet (DDB Model OD-50DXC) are presented in Attachment 5.

#### **4.2.3      Solar Arrays**

Detailed electrical power consumption calculations were performed and various power losses (such as DC to AC conversion efficiency, battery bank efficiency, etc.) were considered. Based on these calculations (Attachment 7), powering the selected air compressor would require a solar array with at least six solar panels. Each solar panel (Suntech model STP190S-24/Ad+ or similar, Attachment 5) will

have approximate dimensions of 32 inches by 62 inches. Therefore, the entire 6-panel array will be approximately 10 feet by 8 feet for each equipment module.

Each solar array will be mounted on top of a 6-inch diameter Schedule 40 steel pipe as shown on Figure 4-4. The 6-inch steel pipe will be 11 feet long: 5 feet of the pipe will be in the ground anchored by concrete within a 30-inch borehole, and 6 feet will be above ground (Figure 4-4). The mounting brackets and hardware for the solar arrays will be capable of withstanding up to 90 miles per hour (mph) wind speed.

The solar array power components will include the following elements: battery bank charge controller, battery bank (four 105 AH deep cycle batteries), DC to AC current inverter, timer, low current switch, and all appropriate wiring and electrical panels. All of these components will be mounted directly on the 6-inch steel pipe below the solar array. The main purpose of the battery bank is to smooth the solar power input fluctuation during the day. However, the size of the solar arrays and the battery banks will allow the system to run only during the daytime solar radiation period (estimated 6 to 9 hours per day).

#### **4.2.4     Controls, Instrumentation and Piping**

The air sparging system piping, controls, instrumentation, and safety interlocks are shown on the piping and instrumentation diagram (Figure 4-2). Physical equipment layout inside each cabinet is shown on Figure 4-3. The equipment parts list is presented in Table 4-1.

During system operation, the compressed air flow will be constantly rotated between three air sparging wells using solenoid valves controlled by an adjustable timing relay. Run-time counters with pressure switches on each line will be used to determine the actual time when air is injected into a particular sparging well. The total air compressor run-time will be determined by a separate run-time counter/pressure switch combination. A high pressure switch will be used to shut down the system in case of over-pressure. Run-time counters will be no-voltage type with a 10-year internal battery life. Therefore, pressure switches will be connected to run-time counters directly, and no voltage will be required in the circuits.

The lines from the equipment cabinet to the air sparging wells will be installed aboveground as shown on Figure 4-3. However, high strength ½-inch outside diameter (OD) stainless tubing (1,337 psig pressure rating) will be used to prevent accidental line ruptures and damage. The wellhead plumbing and a shut-off valve will be housed in a raised well protection vault box (12-inch diameter by 12-inch high) for protection.

#### 4.3 MONITORING WELLS AND WELL POINTS

In order to monitor the effectiveness of this pilot test, two additional monitoring wells and two additional well points will be installed. The wells will be installed 50 feet upstream and 50 feet downstream of the original monitoring well (CEF-003-31S) and Well Point (WP#2) locations, as shown on Figure 4-5.

The monitoring wells shall be installed using DPT. Experiences from previous installation efforts at this site have shown DPT is appropriate for these locations and depths. The monitoring wells installed by DPT will consist of a 1-inch diameter micro-well. The wells will be constructed of Schedule 40, threaded, flush-joint, National Sanitation Foundation (NSF)-approved PVC well screen and riser pipe. Each monitoring well will be screened from 20 feet below ground surface (bgs) to 30 feet bgs (same screen interval as CEF-003-31S), and have a 0.01-inch slot with a 2.5-inch 20/30 factory packed mesh sand. A two-foot bentonite or fine sand seal will be placed above the sand pack and completed to the surface with grout slurry as shown on Figure 4-6. The riser will extend approximately 3 feet above the ground surface with a locking cap at the top, and will be completed with a protective surface casing.

The Well Points will be installed immediately adjacent to the edge of the typical creek water level edge (same approximate location from creek edge as observed in existing Well Point WP#2). The well points will be direct driven to a depth 2 feet below the typical creek water level, which is a total depth of approximately 3 feet bgs; the total depth is dependent on the creek edge slope which is relatively steep. The well points will be constructed of Schedule 40, threaded, flush-joint, NSF-approved PVC well screen and riser pipe. The screen will be 0.01-inch slot measuring 12 inches long; therefore, the screen interval will be located from 2 feet to 3 feet below the typical creek surface level. Typically the creek is about 2 to 3 feet deep along its center line. Additional information regarding previous Well Point installations is contained within Attachment 3.

#### 4.4 AIR SPARGING SYSTEM SITING

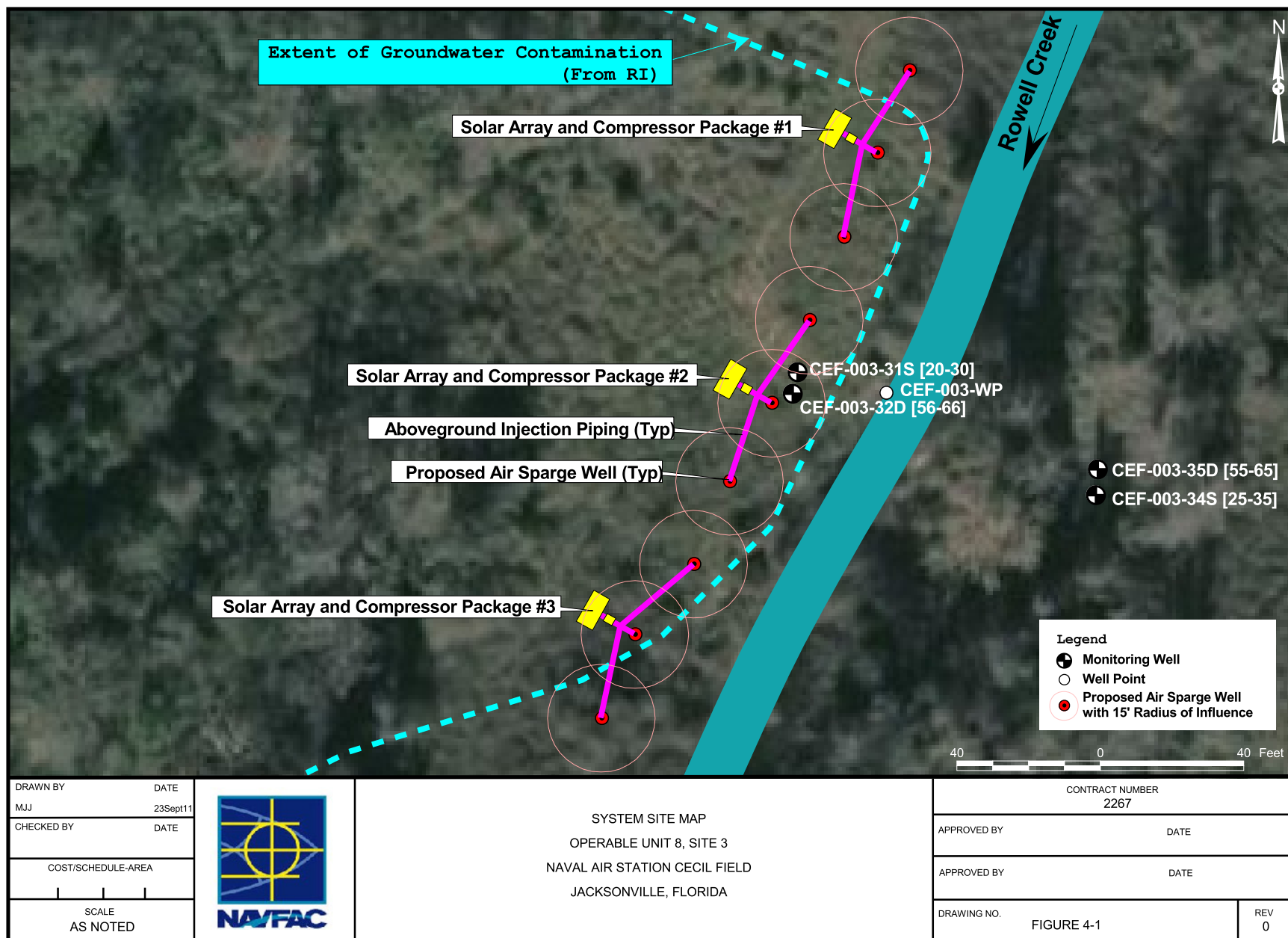
Because the pilot study test is being conducted on Jacksonville Aviation Authority (JAA) property within the flight path of landing aircraft, and there will be elevated solar panel structures on the site, Federal Aviation Administration (FAA) publications were reviewed to ensure compliance for the system siting. Based upon a conservative analysis of *Technical Guidance for Evaluating Selected Solar Technologies on Airports*, November 2010, and *FAA Advisory Circular 150/5300-13*, 1989, most recently amended in 2011, it was determined that the location of the pilot study is outside the Runway Protection Zone (RPZ) configuration/location. Additionally, the solar power array structures do not exceed any obstruction standards contained in 14 Code of Federal Regulations (CFR), Part 77. With respect to aircraft safety, the selected solar panels have low reflective characteristics that utilize patented surface pyramids to

enhance sunlight absorption by redirecting reflected light to other areas on the cell surface to be reabsorbed. Photographs of similar applications are provided on Figure 4-7.



**TABLE 4-1**  
**EQUIPMENT LIST**  
**SITE 3, NAS CECIL FIELD**  
**JACKSONVILLE, FLORIDA**

| <b>No</b> | <b>Item</b>  | <b>PID symbol</b>   | <b>Model/<br/>Part No.</b> | <b>Vendor</b>  | <b>Qty</b> |
|-----------|--|---------------------|----------------------------|----------------|------------|
| 1         | Solar panels   | NA                  | STP190S-24/Ad+             | Genpro         | 18         |
| 2         | 50"H x 25"W x 25"D outdoor cabinet, aluminum construction with sun-reflective paint, double access doors, venting louvers                    | NA                  | OD-50DX©                   | DDB Unlimited  | 3          |
| 3         | Rocking Piston Compressor, Model: , 3.2 SCFM & 20 psig, 40 psig maximum pressure, 1/3 hp, 115 VAC  | AC-A, AC-B, AC-C    | 2660CE37                   | Thomas Gardner | 3          |
| 4         | Mini Programmable Logic Controller (timer), 8 Signal Input/4 Relay Output, 100/240 VAC, Eaton Corp model Easy512-AC-RC                       | PT-A, PT-b, PT-C    | 7244K8                     | McMaster       | 3          |
| 5         | Programming software, Easy-Soft-Basic  | NA                  | Included                   | Wesco          | 1          |
| 6         | Brass Solenoid Valve, ASCO Red Hat part number 8210G094, normally closed, 1/2 FNPT, 115VAaC, 11.6 watts, 120 psi diff pressure, 5/8" orifice | SV-A1 to SV-C3      | 3UL13                      | Grainger       | 9          |
| 7         | Dial-Indicating Flowmeter for Air Aluminum, 1/4" FNPT, 0-10 SCFM, 2-1/2" Dial  | NA                  | 9909K11                    | McMaster       | 1          |
| 8         | Adjustable pressure switch, Dwyer, 5 to 25 PSIG, 1/8" MNPT, normally open  | PS-A to PS-C3       | A2-2801                    | Dwyer          | 9          |
| 9         | Adjustable pressure switch, Dwyer, 20 to 60 PSIG, 1/8" MNPT, normally open   | HPS-A, HPS-B, HPS-C | A2-3811                    | Dwyer          | 3          |
| 10        | Hour meter, no voltage type (dry contact), Trumeter model 7511   | TR-A to TR-C3       | 17015T12                   | McMaster       | 12         |
| 11        | Pressure gauge, 0-30 psig  | PG-A                | 32255K71                   | McMaster       | 3          |
| 12        | 1/2" FNPT bronze ball valve with union end   | V-A to V-C3         | 45135K63                   | McMaster       | 12         |
| 13        | 1/2-inch 304SS tubing, 100' coil   | NA                  | 8989K67                    | McMaster       | 3          |
| 14        | 1/8-inch 304SS tubing, 6' length   | NA                  | 8989K11                    | McMaster       | 3          |
| 15        | 1/2" tube x 1/2" NPT Male Pipe Adapter, brass  | NA                  | 50915K328                  | McMaster       | 9          |
| 16        | 1/8" tube x 1/8" NPT Male Pipe Adapter, brass  | NA                  | 50915K311                  | McMaster       | 18         |
| 17        | Various 1/2" fittings (tees, nipples, etc.)  | NA                  | NA                         | McMaster       | 1          |



KEY EQUIPMENT ITEMS

OILLESS ROCKING PISTON AIR COMPRESSOR (AC-A TO AC-C), THOMAS MODEL 2660CE37 @ 180 Watts, 36 Volts, 32"Wx62"L EACH PANEL; 124"Wx96"L ENTIRE ARRAY POLE-MOUNTED AT ASW-1 TO ASW-3

EQUIPMENT CABINET: OUTDOOR RACK ENCLOSURE DBB UNLIMITED MODEL OD-50DXC ALUMINUM CONSTRUCTION, SUN-REFLECTIVE PAINT (WHITE), LOUVERS FOR VENTING, TWO SIDE ACCESS DOORS

BATTERY PACK: 24 Volts FOUR (4) 12-Volt CELLS @ 105 AH

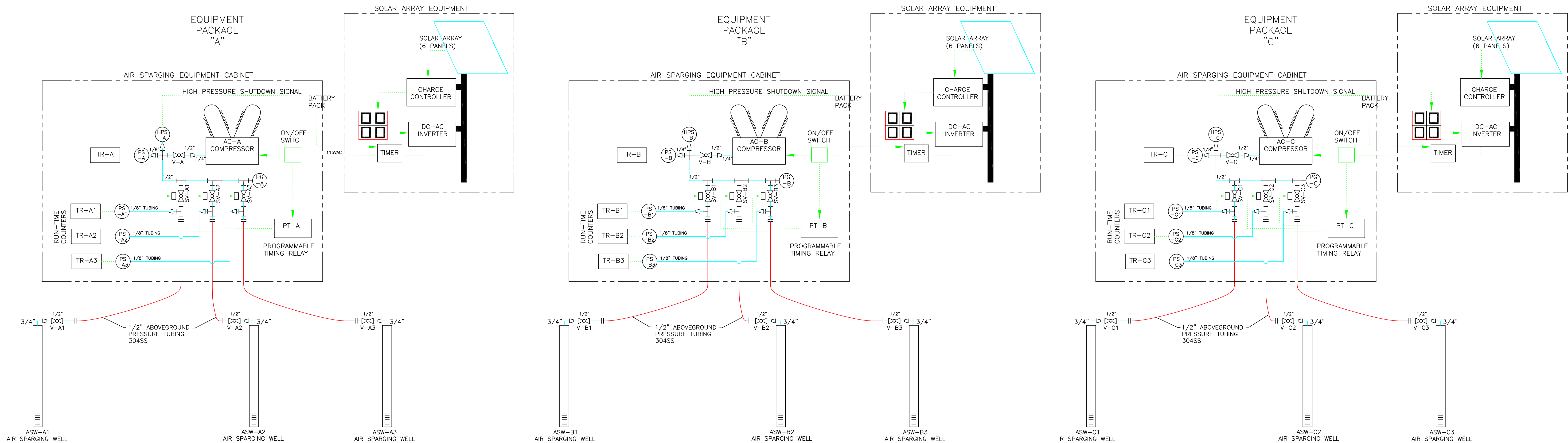
PROGRAMMING TIMING RELAY (PT-A TO PT-C), EATON MODEL EASY512-AC-RC, 4 RELAY OUTPUTS

SOLENOID VALVES (SV-1A TO SV-3C), ASCO RED HAT MODEL 8210G094, 1/2" FNPT, NORMALLY CLOSED, 11.6 WT COIL, 115 VAC

PRESSURE SWITCHES (PS-A TO PS-C3, DWYER MODEL A2-2801, 5 TO 25 PSIG, 1/8" MNPT

HIGH PRESSURE SWITCHES (HPS-A TO HPS-C, DWYER MODEL A2-3811, 20 TO 60 PSIG, 1/8" MNPT

RUN-TIME METER (TR-A TO TR-C3) TRUMETER MODEL 7511, NO-VOLTAGE DRY CONTACT, 10 YEARS BATTERY LIFE



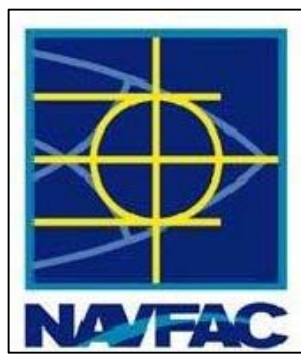
NOTES

- THREE IDENTICAL EQUIPMENT PACKAGES (DESIGNATED AS "A" THROUGH "C") ARE TO BE INSTALLED: TOTAL OF NINE (9) AIR SPARGING WELLS, THREE (3) SOLAR ARRAYS, AND THREE (3) AIR COMPRESSORS.
- AIR FLOW WILL BE ALTERNATED BETWEEN AIR SPARGING WELLS BY PROGRAMMABLE TIMING RELAY.
- INJECTION AIR FLOW IS 3 TO 3.5 CFM. EXPECTED INJECTION PRESSURE AT WELLHEAD IS 15 TO 25 PSIG.
- INJECTION AIR FLOW IS 3 TO 3.5 CFM. EXPECTED INJECTION PRESSURE AT WELLHEAD IS 15 TO 25 PSIG.
- AIR COMPRESSOR IS 1/3 HP WITH 40 PSIG MAXIMUM DISCHARGE PRESSURE.
- SOLAR ARRAY DIMENSION IS APPROXIMATELY 10 FEET BY 8 FEET AT 1080 WATTS TOTAL RATED POWER OUTPUT.

LEGEND

- PS- PRESSURE SWITCH
- PG- PRESSURE GAUGE
- SV- SOLENOID VALVE
- V- BALL VALVE
- AC- AIR COMPRESSOR
- PT- PROGRAMMABLE TIME RELAY
- TR- RUN-TIME COUNTER

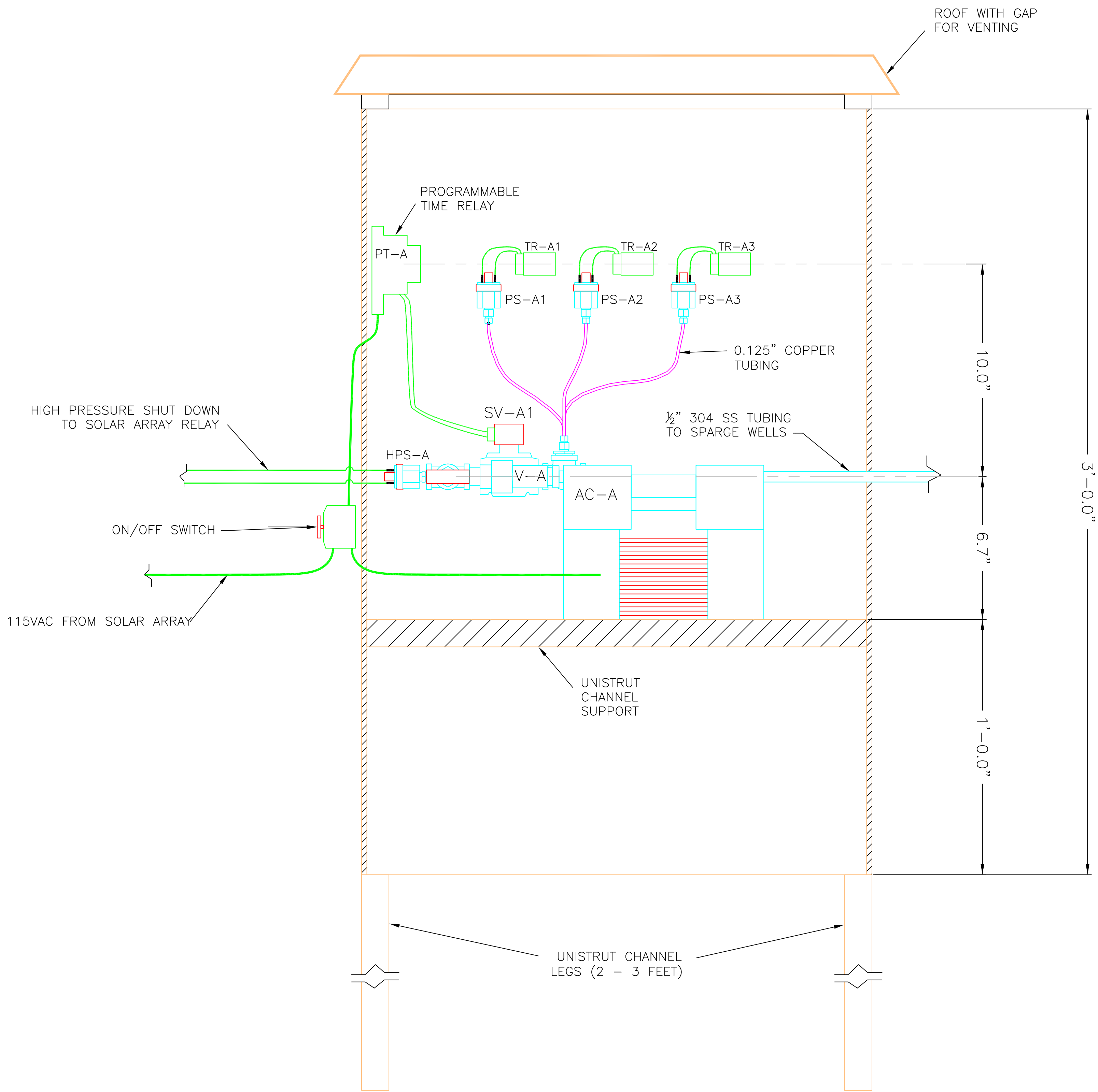
|                    |          |
|--------------------|----------|
| DRAWN BY           | DATE     |
| BD                 | 10-05-11 |
| CHECKED BY         | DATE     |
| RS                 | 10-05-11 |
| COST/SCHEDULE-AREA |          |
| SCALE              |          |
| NTS                |          |



AIR SPARGING SYSTEM P&ID

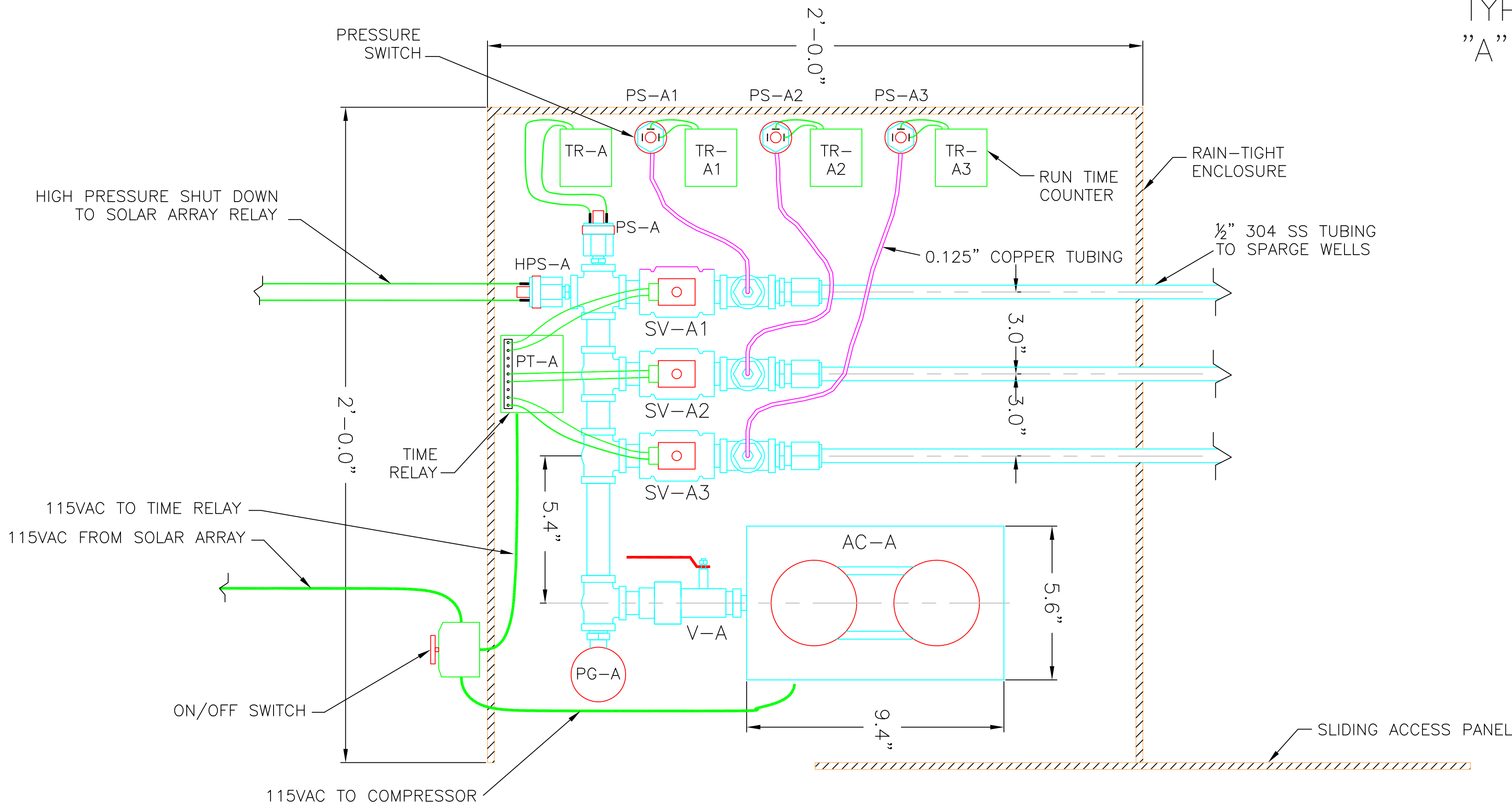
OPERABLE UNIT 8, SITE 3  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

|                         |      |
|-------------------------|------|
| CONTRACT NUMBER<br>JM09 |      |
| DRAWN BY                | DATE |
| DRAWN BY                | DATE |
| DRAWING NO.             | REV  |
| FIGURE 4-2              | 0    |

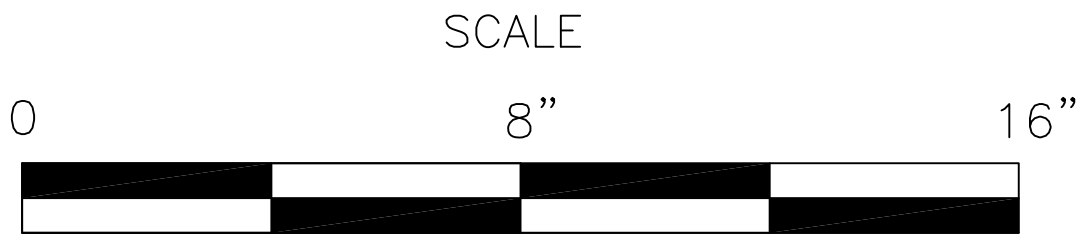


**EQUIPMENT CABINET FRONT VIEW**

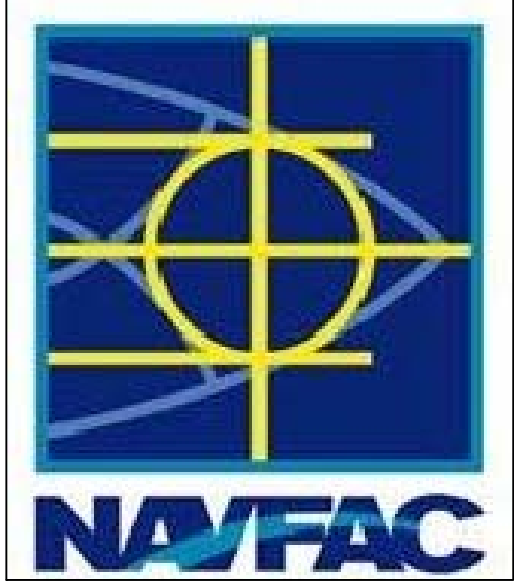
NOTE:  
TYPICAL OF 3 UNITS  
"A" UNIT SHOWN



**EQUIPMENT CABINET PLAN VIEW**



|                    |          |
|--------------------|----------|
| DRAWN BY           | DATE     |
| BD                 | 10-05-11 |
| CHECKED BY         | DATE     |
| RS                 | 10-05-11 |
| COST/SCHEDULE-AREA |          |
| SCALE              |          |
| 1" = 8" (11"x17")  |          |

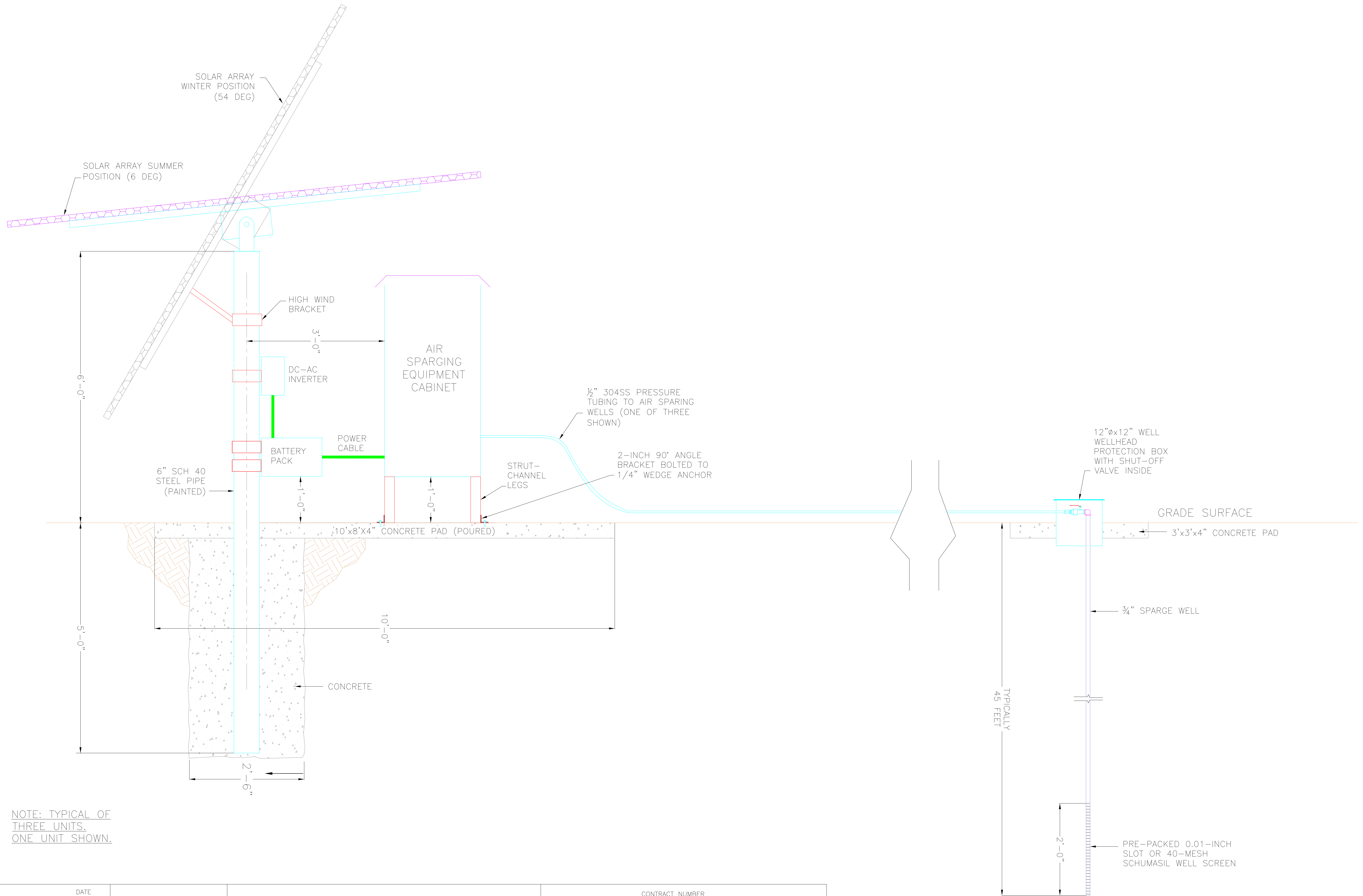


AIR SPARGING EQUIPMENT CONFIGURATION

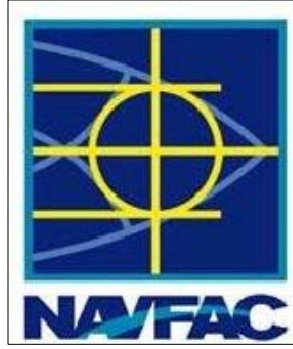
OPERABLE UNIT 8, SITE 3  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

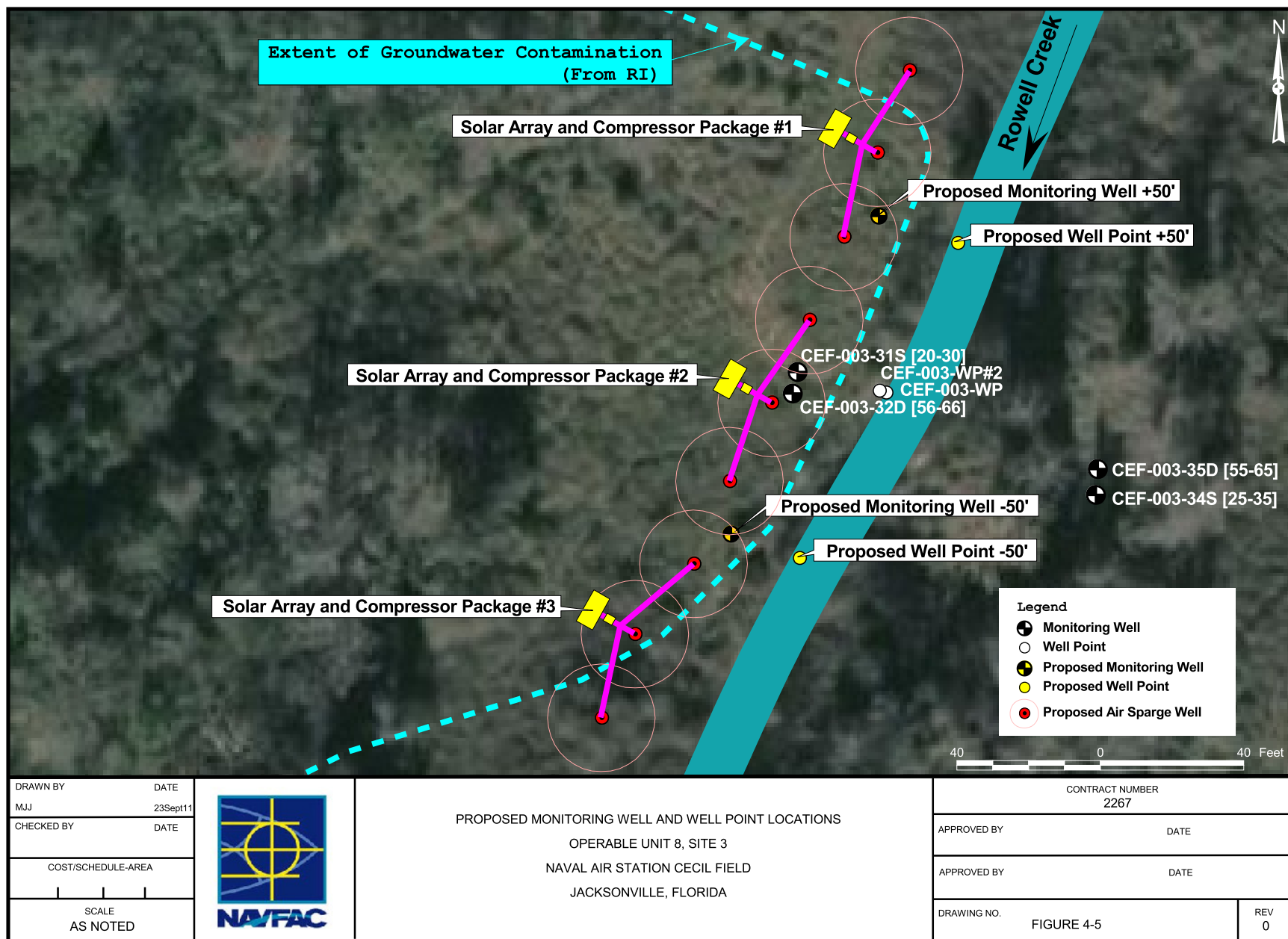
|                 |      |
|-----------------|------|
| CONTRACT NUMBER |      |
| JM09            |      |
| DRAWN BY        | DATE |
| DRAWN BY        | DATE |
| DRAWING NO.     | REV  |
| FIGURE 4-3      | 0    |

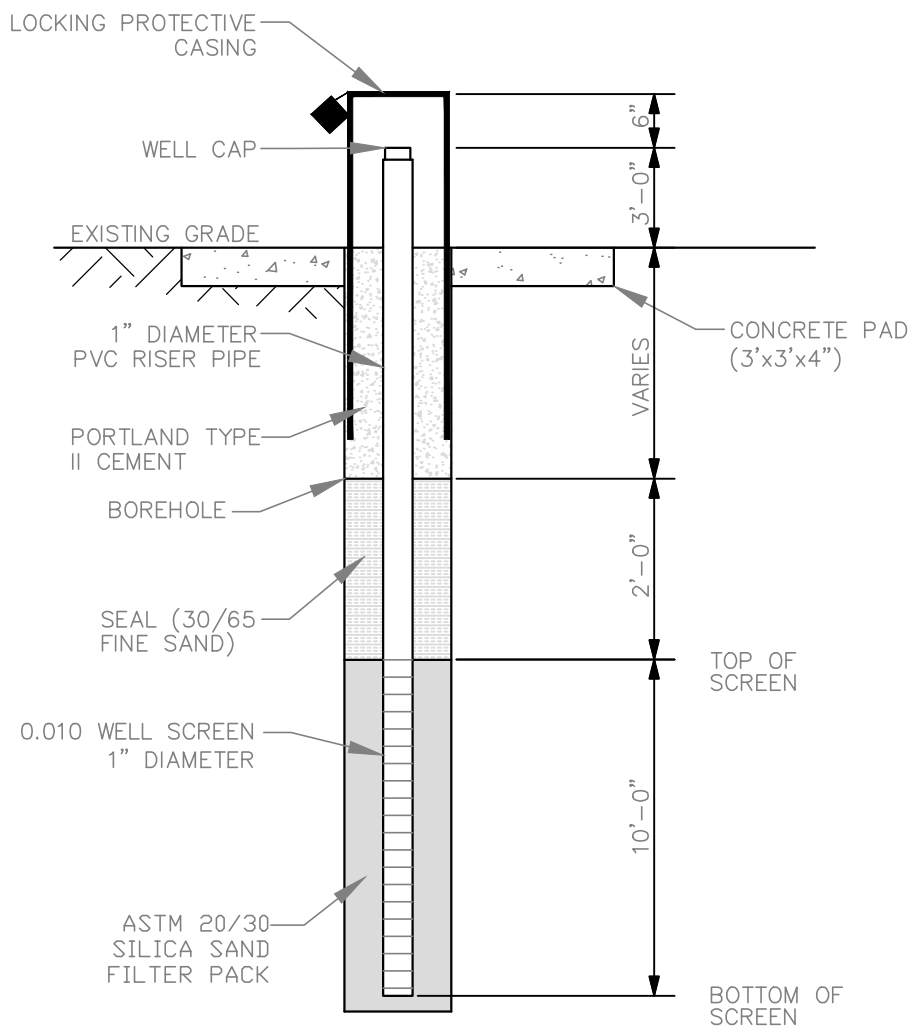




NOTE: TYPICAL OF  
THREE UNITS.  
ONE UNIT SHOWN.

|                    |          |   |                 |   |
|--------------------|----------|---|-----------------|---|
| DRAWN BY           | DATE     |  | CONTRACT NUMBER |   |
| BD                 | 10-05-11 |   | JM09            |   |
| CHECKED BY         | DATE     |   | DRAWN BY        |   |
| RS                 | 10-05-11 |   | DATE            |   |
| COST/SCHEDULE-AREA |          | SCALE   | DRAWING NO.     |   |
|                    |          |   | FIGURE 4-4      |   |
|                    |          |   | REV             | 0 |





**TYPICAL WELL**  
NOT TO SCALE


|   |                 |   |                           |           |
|---|-----------------|---|---------------------------|-----------|
| DRAWN BY<br>MF  | DATE<br>9/26/11 |  | CONTRACT NO.<br>0378      |           |
| CHECKED BY  | DATE            |   | OWNER NO.                 |           |
| REVISED BY  | DATE            |   | APPROVED BY               | DATE      |
| SCALE<br>AS NOTED   |                 |   | DRAWING NO.<br>FIGURE 4-6 | REV.<br>0 |
| MONITORING WELL CONSTRUCTION<br>OPERABLE UNIT 8, SITE 3<br>NAVAL AIR STATION CECIL FIELD<br>JACKSONVILLE, FLORIDA |                 |   |                           |           |



Figure 4-7





## **5.0 SYSTEM INSTALLATION AND STARTUP**

This section describes specific field operations, methods, and procedures to be used for this pilot study field effort during installation, startup, and initial evaluation.

### **5.1 MOBILIZATION/DEMOBILIZATION**

Implementation of the pilot test will be conducted in several phases once the final Work Plan is approved. These phases will include: procurement of equipment, supplies, and professional services; assembling the various components offsite prior to installation; monitoring well, well point, and system well installation; system pad and mounting pole installation; field installation of system; system startup; system operation and maintenance, and evaluation.

During the onsite field activities, the Field Operations Leader (FOL)/site geologist will be assigned the role of Site Safety Officer. A drilling subcontractor will mobilize the necessary personnel, equipment and supplies for air sparging and monitoring well installation. Well points will be installed by Tetra Tech personnel. A separate subcontractor may be utilized to install the steel poles for the solar array supports and concrete works. The air sparging process equipment assembly and installation will be performed by Tetra Tech personnel. The current Health and Safety Plan (HASP) for activities being conducted at the Cecil Field Installation Restoration (IR) sites will be updated to include the proposed activities for this Site 3 Pilot Test effort.

### **5.2 MONITORING AND SYSTEM WELL INSTALLATION**

Two additional monitoring wells and two additional well points will be installed to assist in the evaluation of the effectiveness of the air sparge system. The system wells will be installed by a certified drilling subcontractor in accordance with the information provided in Section 4.2.1, and the monitoring wells will be installed by a certified drilling subcontractor in accordance with the information provided in Section 4.3. The well points will be installed by Tetra Tech personnel in accordance with the information provided Section 4.3.

The drilling subcontractor might also be utilized to install the support posts for the Solar Arrays, or another specialty subcontractor may be procured for this effort. Upon completion of the system installation, a certified surveying subcontractor will be procured to perform the tasks described in Section 5.4.

### **5.3 SYSTEM CONSTRUCTION**

The main components of the air sparging curtain are the air sparging wells (nine total), pole-mounted solar power arrays (three total), air sparging equipment modules (three total), and above-ground compressed air injection lines. The construction details for these components are summarized in the following sections.

#### **5.3.2 Solar Power Arrays**

A total of three solar power arrays with associated equipment will be installed in locations shown on Figure 4-1. Each solar array with all associated electrical components (charge controller, battery pack, etc.) will be mounted on top of a 6-inch diameter Schedule 40 steel pipe as shown on Figure 4-4. The total length of the 6-inch steel pipe will be 11 feet long; 5 feet of the pipe will be in the ground anchored with concrete within a 30-inch borehole. A post hole digging machine or an accessory capable of using 30-inch diameter augers could be used for the purpose of installing these pipes. The steel pipe will be centered within the borehole and anchored with concrete. Depending on the existing ground surface conditions, a small concrete pad (10 feet by 8 feet by 4 inches) will be installed around the 6-inch steel pipe as shown on Figure 4-4 to serve as a base for the air sparging equipment module.

Equipment related to the solar power arrays will be supplied by a vendor as a complete package ready for installation. The hardware brackets for holding the solar panels will be mounted on the top of the 6-inch steel pipe. The solar panels will be attached to the mounting brackets. All power components such as battery pack and charge controller will be attached directly to the 6-inch pipe below the solar array as shown on Figure 4-4. All housings, junction boxes, and electrical wiring will be rain-tight.

#### **5.3.3 System Process Equipment**

The system has been designed to minimize the number of components while providing the information necessary to verify and quantify the operation of the system. The design enables simple component replacement, as needed; however, components were selected with longevity and reliability as a primary consideration.

The air compressor with all its associated controls and instrumentation will be housed in a small pre-fabricated rain-tight ventilated equipment cabinet as shown on Figure 4-3. The equipment cabinet dimensions will be approximately 2 feet wide by 2 feet deep by 4 feet high. The electrical rating for the equipment cabinets is NEMA 3R (protection in outdoor applications against rain, sleet and snow; or indoors against dripping water). The legs of the equipment cabinets will be bolted to the concrete slab

using common concrete anchors as shown on Figure 4-4. The construction details for the equipment cabinet (DDB Model OD-50DXC) are presented in Attachment 5.

The equipment, piping, instrumentation, and controls inside the cabinets will be assembled off-site to minimize the personnel time in the field, and to improve the installation quality. The equipment cabinets will be mobilized to the site as turn-key ready-to-use equipment modules. The modules will be tested and evaluated prior to shipment. Only minor work (such as connecting tubing to the air sparging wells) will be needed in the field.

Each of the air sparging equipment modules will have three aboveground compressed air lines: one to each of its associated air sparging wells. The aboveground lines will be ½-inch OD stainless steel tubing with a pressure rating of 1,337 psig. This high-strength tubing was selected to minimize damage caused by accidental breakage, sun exposure, temperature, and other risk factors. The tubing can be placed slightly below the ground surface to prevent significant heating of the tubing caused by direct exposure to the sunlight. The tubing connections to each sparge well and the wellhead shut-off valve will be housed in a raised wellhead protection box (12-inch diameter steel box with 12-inch galvanized steel sheet metal skirt). A typical sparge well wellhead connection is shown on Figure 4-4.

#### **5.4 DECONTAMINATION, INVESTIGATION-DERIVED WASTE HANDLING, AND SURVEYING**

Decontamination activities will be conducted during the installation of the sparge wells, monitoring wells and well points in accordance with the Tetra Tech Decontamination of Field Equipment and Waste Handling Standard Operating Procedure (SOP).

Investigation-derived waste (IDW) generated during the pilot study is to be handled and disposed in accordance with the Tetra Tech Decontamination of Field Equipment and Waste Handling SOP and NAS Cecil Field practices. Purge water waste from well sampling will be stored in drums. The drums will be transported to the IDW storage building until they can be properly disposed.

The locations of new air sparging wells, monitoring wells, well points, air sparging equipment modules, and compressed air lines will be surveyed upon completion of the installation.

#### **5.5 START-UP OPERATION**

Startup of the sparge curtain system will be performed after all construction activities are completed. Start-up activities for each equipment module will be identical. The primary tasks during the start-up of each equipment module are as follows:

- Perform functional equipment tests and shakedown
- Evaluate system daily run-time duration (solar arrays)
- Determine sparge wells pulsing intervals
- Evaluate ROI

A period of sunny weather is preferable for the system start-up. Following the system construction, the electrical wiring and mechanical set-up will be checked according to the equipment manufacturer's recommendations. The battery pack charge controller at each solar array will then be turned on to charge the batteries. The approximate time the battery packs take to acquire a full charge will be recorded.

#### **5.5.1      Daily Run Time**

Initially, the individual sparging wells will be tested in a manual mode. After the batteries are fully charged, the air compressors in each equipment module will be turned on at a pre-determined time of the day (1 to 2 hours after sunrise). At this time during the initial start up evaluation, the control valves will be configured such that only one sparge well (out of three) associated with each equipment module will be connected to the air compressor discharge. For example, initially wells ASW-A1, ASW-B1, and ASW-C1 will be operated (solenoid valves SV-A1, SV-B1, and SV-C1 will be open; wellhead valves V-A1, V-B1, and V-C1 will be open; and the rest of the valves will be closed) (See Figure 4-2).

When the injection flow and pressure stabilize (see Section 5.5.2 below), the control valves will be manually switched to allow wells ASW-A2, ASW-B2, and ASW-C2 to operate (solenoid valves SV-A2, SV-B2, and SV-C2 will be open; wellhead valves V-A2, V-B2, and V-C2 will be open; the rest of the valves will be closed) (See Figure 4-2). Finally, after pressure and flow stabilize, the control valves will be manually switched to allow wells ASW-A3, ASW-B3, and ASW-C3 to operate (solenoid valves SV-A3, SV-B3, and SV-C3 will be open; wellhead valves V-A3, V-B3, and V-C3 will be open; the rest of the valves will be closed) (See Figure 4-2).

During this initial phase of the start-up, the air compressors will be allowed to run until the low voltage sensor detects that the battery pack has been depleted to the designated level and turns the system off. It is anticipated that the level of depletion will be set at 25 percent (75 percent capacity remaining). Note that the system is designed so that operation of the air compressor uses less voltage than what is produced by the solar panels in typical sunlight. The period of time from initial start-up to when the low voltage sensor shuts the system off will be considered the longest run time duration attainable at that time of the year, provided that the start-up is performed on a sunny day. The solar array timers will then be adjusted for a daily system run time that is less than this maximum attainable run time in order to prevent an excessive battery pack discharge. It is preferred that the timers shut off the system rather than relying on the low voltage sensor. Battery performance and life expectancy are optimized when draining of the

battery pack is minimized. This daily run-time duration will be adjusted during the year to account for a changing daylight time duration as discussed in Section 6.2. It is expected that the daily runtime duration will vary from 6 to 9 hours.

The hours of daylight and solar noon information for any given day or time period can be found at: <http://www.timeanddate.com/worldclock/astronomy.html?n=411>. This information will be used to assist in the setting of the timers, as will site-specific observations such as the locations of trees and other nearby obstructions.

### **5.5.2      Pulse Frequency**

During the testing of individual sparging wells in a manual mode (as described in Section 5.5.1 ), a detailed record of pressure and air flow changes versus time will also be created. Air flow meters will be used during the start-up to confirm the pressure versus flow performance curve for the air compressors. After the start-up, air flow meters will be taken off line to reduce pressure losses and to prevent mechanical damage. The air flow meters used during the start-up will be direct reading variable area type with 0 to 10 SCFM scale. Periodic checks to confirm performance curves will be conducted with the monthly evaluations. If necessary, data logging pressure transducers will be used to record the changes in the injection pressure. A record of pressure and air flow changes versus time will be developed for each of the air sparging wells in the curtain.

It is expected that immediately after the compressor start-up, the pressure will build up to a maximum level and then gradually decrease until it reaches a near constant level when all injected air pathways within the saturated formation are established. The injection air flow will likely gradually increase and then reach a near constant level as pathways for the compressed air become fully developed. Sparging well pulse frequency will be the time needed for the injection flow and pressure to stabilize. It is expected that the pulse frequency initially will be 1 hour. Because the sparge wells are located in areas of similar geology and are constructed in the same way, the pulse duration is expected to be similar for all of the sparge wells in the curtain. The programmable timers within the sparging equipment cabinets will be programmed to automatically maintain the selected pulse frequency, and rotate the air flow between the sparge wells.

### **5.5.3      Radius of Influence**

The existing and new monitoring wells and well points in Rowell Creek will be used to determine the ROI of the sparging wells in the curtain. Prior to the system start-up, baseline measurements of depth to water and several field parameters (dissolved oxygen, ORP, pH, temperature, conductivity) will be taken. The following monitoring wells and well points will be used for this purpose:

- CEF-003-20S (existing monitoring well) – in area, but screened at 4 feet to 14 feet bgs.
- CEF-003-28S (existing monitoring well) – significant distance (400 feet) from test area.
- CEF-003-31S (existing monitoring well) – within treatment area.
- CEF-003-40S (new proposed monitoring well) – within treatment area.
- CEF-003-41S (new proposed monitoring well) – within treatment area.
- CEF-003-WP2 (existing well point) – within treatment area.
- CEF-003-WP3 (new proposed creek well point) – within treatment area.
- CEF-003-WP4 (new proposed creek well point) – within treatment area.

During the system start-up, regular measurements will be collected of depth to water in the monitoring wells and well points, and the other field parameters. The Evaluation Worksheet (page 4 of 6 ROI Measurement Data in Attachment 8) will be used to record this information. Because the depth to water at the site is very shallow and the monitoring wells are in close proximity to the sparge curtain, it is possible that after the air sparging system start-up the groundwater will flow out of the monitoring wells. To prevent this, monitoring well casings may be extended aboveground or the wells may be sealed.

Baseline groundwater sampling which will be conducted prior to system startup is discussed in Section 6.0.

## **6.0 OPERATION, MAINTENANCE, AND EVALUATION**

This section describes the requirements and procedures for the pilot study system operation and maintenance, and the evaluation of the system's operation and effectiveness.

### **6.1 GROUNDWATER MONITORING**

The effectiveness of the system will be evaluated primarily based on its ability to reduce contaminant concentrations in the well point and treatment area monitoring well groundwater samples. A baseline sampling event will be conducted after well installation and before AS system startup activities. The wells that will be used to evaluate the effectiveness of the system are: three monitoring wells (CEF-003-31S, CEF-003-40S, and CEF-003-41S) and three well points (WP#2, WP#3, and WP#4). These wells and well points will be sampled and analyzed for VOCs in accordance with the procedures and methods identified in the UFP-SAP approved for Site 3 groundwater monitoring efforts (Tetra Tech, 2011).

Site 3 is currently being monitored on an annual basis every September under the long-term monitoring program; however, the following additional sampling of the six wells to establish a baseline is proposed:

- Baseline (after well installation and before system startup).
- One month after system startup.
- Quarterly (3 months after system startup and for the next three quarters after that to provide monitoring of system for a 1-year period).
- Annually (the newly installed wells will be added to the LTM monitoring program to verify compliance at the well point locations).

Table 6-1 provides a summary of the analyses, methodologies, bottle requirements, preservation requirements, and holding times for the samples to be submitted for fixed-base laboratory analysis.

### **6.2 SYSTEM EVALUATIONS**

System evaluations will be conducted in conjunction with the operation and maintenance activities. It is assumed that after system startup, bi-monthly site visits will be performed to check the system status and to collect measurements of the operational parameters. Evaluations will be conducted monthly after the system has established an acceptable performance record.

During each evaluation, a routine equipment status check will be performed according to the equipment manufacturer's recommendations. The form to be completed for this status check is provided in Attachment 8. The system process piping will be checked for leaks. The monitoring wells and well points in the vicinity of the air sparging curtain will also be checked for water and air seeps. Rowell Creek will be visually checked for air bubbles. The following operational parameters will also be recorded during each site visit:

- Injection pressure at each compressor (pressure gauges PG-A, PG-B, and PG-C; Figure 4-2).
- Injection air flow, which will be determined based on the injection pressure measurements (start-up data and manufacturer's compressor test data in Attachment 7).
- Total run time of each air compressor (run-time counters TR-A, TR-B, and TR-C; Figure 4-2).
- Total run time of each sparge well (run-time counters TR-A1, TR-A2, TR-A3, TR-B1, TR-B2, TR-B3, TR-C1, TR-C2, and TR-C3; Figure 4-2).
- Solar array system performance data (charge controller log for previous 128 days).

The information collected will be used to determine the system operational history for the period between the personnel site visits.

The solar arrays will also be adjusted periodically to maintain optimum efficiency and run time. The following solar array adjustments will be performed every 2 months depending on the actual operational requirements:

- Solar array angle: will vary from 6 degrees at summer solstice to 54 degrees at winter solstice. Adjustments will be made in equal increments (8degree increments if adjustments are performed every 2 months).
- Solar array timer daily run time duration: will vary from maximum duration at summer solstice to minimum duration at winter solstice. Adjustments will be made in equal increments (if duration in June is 9 hours and in December is 6 hours, the increments would be ½ hour every 2 months).



### **6.3 OPERATION AND MAINTENANCE**

The air compressors are the only system equipment items with moving parts. Therefore, the operation and maintenance of the air sparging curtain is not expected to be labor intensive. It is assumed that initially bi-monthly site visits will be performed to check the system status and to collect measurements of the operational parameters. The duration between site visits will likely be increased once the system is fully operational and a performance record has been established.

It should be noted that the sparging curtain is located in an area where hurricanes may occur. The solar arrays are designed to withstand up to 90 miles per hour (mph) wind. However, it is recommended that the solar panels and equipment cabinets be removed and stored off site if a hurricane is forecasted.

### **6.4 TROUBLESHOOTING**

If a high pressure alarm switch triggers an equipment module shut-down, then the alarm condition will be cleared and the equipment module will be re-started.

It is also possible that the low voltage sensor cut-off limit will need to be adjusted periodically.

Injection air flow will be determined based on the injection pressure rate ROI.

#### **6.4.1 Automatic Shutdown**

A high pressure switch in each of the equipment modules (PS-A, PS-B, PS-C; Figure 4-2) will shut down the air compressor if the injection pressure exceeds a preset-point. The most likely cause of this would be a malfunction of a solenoid valve. The air compressor will remain shut off until the system is manually reset and restarted.

#### **6.4.2 System Shutdown and Re-Start**

System shutdown will be conducted in the manual mode. To shut down the system, the "On/Off" switch on the equipment cabinet will be turned to the "Off" position (Figure 4-3).

Following an automatic shutdown, the system will be restarted after determining and correcting the cause of the automatic shutdown. Prior to resetting and restarting the system, all wellhead valves will be opened (VA-1 through VC-3). The "On/Off" switch on the equipment cabinet will be reset (Figure 4-3). The same procedure will be followed to restart the system after manual shutdown.

TABLE 6-1

**SUMMARY OF FIXED-BASE LABORATORY ANALYSES, METHODOLOGIES, BOTTLE REQUIREMENTS,  
PRESERVATION REQUIREMENTS, AND HOLDING TIMES  
OPERABLE UNIT 8 SITE 3  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA**

| <b>Analysis</b>        | <b>Analytical Method or SOP</b> | <b>Quantity of Samples<sup>(1)</sup></b> | <b>Quantity of Containers per Sample</b> | <b>Container Type</b>                                 | <b>Preservation Requirements</b> | <b>Holding Times<sup>(2)</sup></b> |
|------------------------|---------------------------------|--|--|---|----------------------------------|------------------------------------|
| <b>Aqueous Samples</b> |                                 |  |  |   |                                  |                                    |
| Chlorinated VOC        | SW-846 8260B                    | 6  | 3  | 40-mL vials with Teflon septa<br>(Borosilicate glass) | Cool to 4°C<br>HCl to pH ≤ 2     | 14 days to analysis                |

SOP      Standard operating procedure.

VOC      Volatile organic compounds.

1      Samples per event. Number does not include QA/QC samples to be analyzed.

2      All holding times are determined from date of collection.

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**ATTACHMENT 1**

**EPA MEMORANDUM REGARDING SITE 3 YEAR 12  
GROUNDWATER MONITORING REPORT**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4

61 Forsyth Street  
Atlanta, Georgia 30303-3104

August 11, 2011

4SD-TSS

MEMORANDUM

SUBJECT: NAS Cecil Field, Jacksonville, Florida

FROM: William N. O'Steen, Environmental Scientist  
Technical Services Section, Superfund Division

THROUGH: Glenn Adams, Chief  
Technical Services Section

TO: Deborah A. Vaughn-Wright, Remedial Project Manager  
DOD Section

This memorandum responds to your request for a review of **the Final Year 12 Annual Groundwater Monitoring Report, September 2010, Site 3, Former NAS Cecil Field, Jacksonville, Florida**. This document is referred to herein as 'the Report.' I am not providing you with comments per se on the contents or structure of this document. Rather, this memorandum presents an independent data analysis for your consideration. If this presentation does not meet your needs, please inform me and I can prepare a supplemental memorandum that is strictly a review of the Report. For your convenience, discussion in this memorandum is referenced to specific sections or pages of the Report, as applicable, and a summary of the review is included at the end of the memorandum text. If you need additional technical assistance on this project, please contact me.

Background Discussion

Site 3 remedial action began in 1999 with air sparging of groundwater in the general contaminant source area. The air sparging remedial action continued on an intermittent basis from May 2000 until the summer of 2002. According to text at the end of Section 1.2 of the Report, the air sparging groundwater remedial action at Site 3 has been offline since sometime between a late July 2002 sampling event and a September 2002 sampling event. Therefore, since that time, natural attenuation of groundwater contamination has been the sole groundwater remedial action occurring at Site 3. Thus, one might ask how effectively the natural attenuation of groundwater contamination is proceeding since the initial sampling event following shutdown of the air sparging system (September 2002 and more recent groundwater samples).

Figure 4 of the Report shows monitoring wells at which there are current exceedances of one or

more of Florida's Groundwater Cleanup Target Levels (GCTLs) and/or an exceedance of concentrations of naturally occurring inorganics established as background values (inorganic background data set (IBDS)). Based on Figure 4, there are three areas of interest for a review of the monitoring data collected beginning in September 2002: the general source area (currently of interest are data from CEF-003-06S, CEF-003-07S, and CEF-003-13S); a location midway between the general source area and the groundwater discharge area to the east, represented by data from CEF-003-28S; and data from monitoring locations near the groundwater discharge area, (CEF-003-31S and CEF-003-WP). This review memorandum evaluates conditions in each of these three areas with respect to the progress of groundwater cleanup in the passive remedial environment (remediation through only natural attenuation).

### Review of Data from the General Source Area

Figure 4 of the Report identifies wells CEF-003-06S, CEF-003-07S, and CEF-003-13S (hereafter identified in this memorandum as wells 6S, 7S, and 143S) as the three source area wells with current groundwater contamination of concern. A review of Table 3 in the Report indicates the following contaminants of interest in each of these three wells (see Table 1 of this memorandum below). For purposes of this review, contaminants of interest are those that currently or have typically and recently exceed a Florida GCTL or background concentration (as flagged in the Report) and/or a contaminant that is a potential degradation product of one or more contaminants that exceed a GCTL.

**Table 1. Contaminants of Interest in the General Source Area**

| Monitoring Well | Contaminants of Interest  | Comments   |
|-----------------|---|--|
| 06S             | 1,1-dichloroethane, 1,1-dichloroethene, benzene, chloroethane, vinyl chloride   | 1,1-dichloroethane and chloroethane are biodegradation products of 1,1,1-trichloroethane; 1,1-dichloroethene is a potential <u>abiotic</u> 1,1,1-trichloroethane degradation product; vinyl chloride is a degradation product of biodegradation of trichloroethene |
| 07S             | 1,1-dichloroethane, 1,1-dichloroethene, chloroethane, cis 1,2-dichloroethene, trichloroethene, dissolved manganese  | cis 1,2-dichloroethene is a degradation product of biodegradation of trichloroethene; dissolved manganese data in the Report only cover samples obtained since January 2007  |
| 13S             | 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, cis 1,2-dichloroethene, trichloroethene, total xylenes, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2-methyl naphthalene; naphthalene, dissolved iron | 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2-methyl naphthalene and naphthalene are identified in the Report as semivolatile organic compounds; dissolved iron data in the Report only cover samples obtained since January 2007                                    |

Based on Figure 4 of the Report, 13S is clearly the well in the general source area with the highest overall degree of groundwater contamination. Figure 1 of this memorandum plots 13S groundwater concentration data for the period since the active groundwater remediation ended (September 2002 and later), showing the contaminants with the most significant levels of contamination relative to their performance standards (and their degradation products, if present). Data are shown at a log scale because of the wide concentration ranges of the different contaminants. There are numerous important conditions that can be observed or inferred from

Figure 1:

- Initial concentrations from September 2002 are all very low relative to most of the later results. The first sample reflects concentrations influenced by the air sparging groundwater remedial action.
- Initially, both 1,1,1-trichloroethane and 1,1-dichloroethane concentrations increased after the September 2002 sample, reflecting the adjustment to a condition where the air sparging remedial action no longer was influencing the groundwater quality. For samples collected after 2006, the 1,1,1-trichloroethane concentrations appear to have decreased, while the 1,1-dichloroethane concentrations remained steady or continued to increase somewhat. This condition probably reflects ongoing biodegradation of the 1,1,1-trichloroethane to produce 1,1-dichloroethane. A decrease in 1,1,1-trichloroethane concentrations over time cannot be confirmed through statistical analysis. An increase in 1,1-dichloroethane concentrations over time is indicated by nonparametric statistical trend analysis.
- 1,1-dichloroethene concentrations increased after cessation of the active remedial action, then apparently began to decrease at about the same time that the 1,1,1-trichloroethane concentrations were decreasing. This pattern indicates that degradation of 1,1,1-trichloroethane is probably or mostly a biotic process, because significant abiotic degradation of 1,1,1-trichloroethane to produce 1,1-dichloroethene should have caused an increase or stabilized the 1,1-dichloroethene concentration.
- Trichloroethene concentrations peak after the initial sample (an increase from 5.2 ug/L in September 2002 to 1490 ug/L in February 2003). Then, after the high concentration observed in February 2003, trichloroethene concentrations fluctuated throughout the remainder of the monitoring period. There may be a trend of declining concentrations for the later monitoring events. This supposition is supported by the apparent concentration trends for cis 1,2-dichloroethene, but cannot be supported by nonparametric statistical trend analysis of the trichloroethene data. Further monitoring data from this well may result in statistical confirmation of a probable downward trend in trichloroethene concentrations. If so, it should be possible to predict when trichloroethene concentrations at this location will decrease to a level below the 3 ug/L Florida primary drinking-water standard. A preliminary evaluation of the progress of reduction of trichloroethene concentrations through natural attenuation processes suggests that with a 1490 ug/L concentration in February 2003 and a 417 ug/L concentration in September 2010, the most optimistic time period for concentrations of trichloroethene to decrease to below 3 ug/L exceeds 30 years. This estimation considered that as 417 ug/L is approximately 28% of 1490 ug/L and such a decrease occurred over a 7.5-year period, continued progression would result in 28% of a 417 ug/L concentration remaining after 15 years, 28% of that concentration would remain after 22.5 years, and so forth.
- cis 1,2-dichloroethene concentrations have generally increased since the initial sample. The first sample collected after September 2002 showed a strong increase in the cis 1,2-dichloroethene concentration, similar to that observed for trichloroethene. After this sharp increase in the concentration of cis 1,2-dichloroethene, the concentration dropped substantially in the next sample. However, following the decrease, the cis 1,2-dichloroethene concentration started to rise and has continued to increase over the course of the monitoring period. A trend of increasing concentrations of cis 1,2-dichloroethene is supported by nonparametric statistical trend analysis. The rising concentration of cis



1,2-dichloroethene indicates that at least some of the trichloroethene concentration decrease is occurring through reductive dechlorination.

- trichloroethene is present in higher concentrations than cis 1,2-dichloroethene across the entire monitoring period.
- The most recent concentration of trichloroethene was 417 ug/L. This concentration exceeds Florida's primary drinking-water standard of 3 ug/L by a factor of 139x. The "natural attenuation default criterion" for trichloroethene is 100x the drinking-water standard, or 300 ug/L. Thus, using the state of Florida's approach for consideration of monitored natural attenuation as a groundwater remedial strategy, the trichloroethene concentration at 13S exceeds the value that the state considers as the maximum level at which monitored natural attenuation may be an appropriate remedial strategy.
- It is unclear from the monitoring data shown on Figure 1 if the concentrations of 1,2-dichlorobenzene and 1,4-dichlorobenzene are changing over time. Nonparametric statistical trend analysis indicates there has been no change in the concentrations of these contaminants. These contaminants are less environmentally mobile and probably less degradable than chlorinated ethenes and ethanes in anaerobic geochemical environments. Thus, it is not surprising that the dichlorobenzenes are relatively stable in concentration and there is no substantive evidence they are decreasing in concentration at 13S.
- 2-methylnaphthalene and naphthalene are similar non-chlorinated semivolatile organic compounds. There is no obvious trend in the concentration of these compounds. They would not be expected to rapidly biodegrade in an anaerobic subsurface environment.

Figure 2 shows trichloroethene and 1,2-DCE concentration data for general source area wells 13S and 7S. These compounds were not present in substantive concentrations in any of the 6S samples collected since September 2002. Figure 2 data are plotted at a log scale to show the wide range in concentrations. Figure 2 shows differing patterns at 7S and 13S. The trichloroethene and cis 1,2-dichloroethene data for 13S are discussed above. Unlike at 13S, there was no rapid increase in 7S trichloroethene and cis 1,2-dichloroethene concentrations after the active remedial action stopped. This differentiation suggests that either the air sparging had a limited effect on the 7S concentrations or that a more prominent degree of residual contaminant mass is present around the 13S location. 7S also shows a widely varying range in concentrations, with no clear trend in concentrations present. The 7S cis 1,2-dichloroethene concentration is generally higher than the trichloroethene over the period shown, and is indicative of some trichloroethene biodegradation around the well. However, the ratio of cis 1,2-dichloroethene to trichloroethene fluctuates over the period of monitoring and thus there is no obvious indication from 7S data of a progressive increase in trichloroethene biodegradation following the cessation of air sparging. The ratio of cis 1,2-dichloroethene to trichloroethene is generally higher to much higher in the samples collected after September 2002 compared to the September 2002 ratio. This difference probably reflects a more favorable geochemical environment for reductive dechlorination after the air sparging remedial action ended.

Figures 3a-3c plot the concentrations of 1,1-dichloroethane, 1,1-dichloroethene, and chloroethane in samples from wells 6S, 7S, and 13S. Chloroethane was not found in substantive concentrations in the 13S samples.

For 1,1-dichloroethane, data from 13S show a progression of increasing concentrations following cessation of active remedial actions. 1,1,1-trichloroethane is the parent compound of this

degradation product and is present in higher concentrations than 1,1-dichloroethane after the September 2002 monitoring event. However, later sample results indicate a higher proportion of 1,1-dichloroethane relative to 1,1,1-trichloroethane present in the 13S samples, suggesting probable greater biodegradation of 1,1,1-trichloroethane occurring at later monitoring periods. For 7S, the later samples tend to have somewhat higher concentrations of 1,1-dichloroethane relative to the earlier samples. As there is no appreciable 1,1,1-trichloroethane contamination in any of the 7S samples from 2002 or later, there is an uncertain cause of the fluctuating concentrations of 1,1-dichloroethane. 6S 1,1-dichloroethane concentrations are higher than the 1,1-dichloroethane concentrations in 13S and 7S. 6S concentrations show considerable fluctuation, from less than 10 ug/L to more than 600 ug/L. There is some apparent correlation between the higher 6S concentrations of 1,1-dichloroethene and higher 7S concentrations of 1,1-dichloroethane. This apparent correlation suggests that shifting groundwater flow directions or water-level fluctuations are responsible for the large concentration swings observed at these two wells.

The 1,1-dichloroethene concentration at 13S is considerably higher than the concentrations observed in the 6S and 7S samples. Figure 3b suggests that 13S concentrations of 1,1-dichloroethene are decreasing over time after the dramatic rise in concentration following shutdown of the active remedial action. However, such a downward trend cannot be confirmed using nonparametric statistical analysis. For 6S and 7S data, there appears to be an increasing concentration of 1,1-dichloroethene for the data from 2003 and later. However, such a trend is not confirmed through nonparametric statistical analysis. To summarize, there is no indication of any trend in the 1,1-dichloroethene concentration following shutdown of the air sparging remedial action. 13S 1,1-dichloroethene concentrations showed a dramatic rise after active remediation stopped. There was no clear response of 6S and 7S 1,1-dichloroethene concentrations to shutdown of the air sparging.

The chloroethane concentrations for 6S and 7S appear to show increasing concentrations over time. However, because of the considerable variability, nonparametric statistical analysis cannot confirm an overall increasing concentration trend for either well. Higher chloroethane concentrations following shutoff of the air sparging system would be consistent with enhanced reductive dechlorination in a more anaerobic environment.

#### Review of Data from Well 28S

Monitoring well 28S is located approximately 700 feet east of the general source area. Using the same criteria for identifying contaminants of interest in the general source area (see the first paragraph of the previous section of this review memorandum), 28S contaminants of interest are 1,1-dichloroethene, cis 1,2-dichloroethene, trichloroethene, and naphthalene. The question arises as to whether or not these contaminants are decreasing over time in the period following the cessation of the active remedial action and, if so, how rapidly are they decreasing at 28S.

Figure 4 is a plot of the concentration trends of the four contaminants of interest at 28S. The data clearly indicate decreasing concentrations of each of the contaminants. The question then arises as to the anticipated time when the concentrations of contaminants at this monitoring well will eventually decrease to their respective drinking-water standards (MCLs) or for naphthalene,

decrease to below the Florida groundwater cleanup target level (GCTL). There is no one answer to this question, because of some uncertainty as to the true slope of the trend line.

Uncertainty on the trend line slope was evaluated for each of the contaminants to predict when contaminant concentrations might attain their respective MCL or GCTL. Figure 5 is a plot of the results of this analysis for 1,1-dichloroethene. This figure shows that the best fit linear trend line predicts the time to attain the 7 ug/L MCL could be within one year. The 95% lower confidence level on the slope of the trend line indicates that MCL could be reached in about 4.5 years; probably in early 2016.

Using the 95% lower confidence limit on the trend line slope as an indicator of when the concentrations of contaminants at 28S might be expected to decrease to their respective MCLs or GCTLs, the following results are obtained:

1,1-dichloroethene: will probably attain its performance standard within about 4.5 years (early 2016)

Trichloroethene: will probably attain its performance standard within about 2.75 years (mid 2014)

Based on the available data, cis 1,2-dichloroethene has probably already decreased in concentration to below its performance standard, and naphthalene has probably decreased to below its Florida GCTL.

#### Review of Data from Wells 31S and CEF-003-WP

31S is located in close proximity to the stream that is the discharge point for shallow groundwater. CEF-003-WP is a hand-driven well point installed at the discharge point of groundwater migrating from Site 3. This well point is installed, sampled, and then removed at each sampling event (reference Report Section 2.0). It is located a short distance east of 31S.

At 31S, contaminants of interest are 1,1-dichloroethene, benzene, cis 1,2-dichloroethene, and vinyl chloride. At CEF-003-WP, the primary contaminant of interest is vinyl chloride. 1,1-dichloroethene has not been detected at CEF-003-WP since July 2004 (1.4 ug/L); cis 1,2-dichloroethene is periodically detected, but at concentrations less than 1 ug/L. Benzene is also periodically detected in CEF-003-WP samples. Most recently, benzene was detected at a concentration of 1.4 ug/L in July 2006 and again in the September 2010 sample, with four intervening samples showing no trace of benzene.

February 2003-September 2010 31S data for the four contaminants of interest are plotted on Figure 6. Figure 6 indicates that the concentration of cis 1,2-dichloroethene is probably decreasing at this well. The 1,1-dichloroethene concentration may be decreasing. The vinyl chloride concentration may be increasing, possibly as a result of ongoing reductive dechlorination of cis 1,2-dichloroethene in the subsurface geochemical environment near the stream. This reductive dechlorination process is apparently relatively robust in this area, as CEF-003-WP samples have shown very little contamination by cis 1,2-dichloroethene, despite its being present in substantive concentrations in the 31S samples. The benzene concentration

appears to show no trend of declining concentrations.

Nonparametric statistical analysis was used to evaluate potential trends in all four 31S contaminants of interest. Table 2 summarizes the results of this evaluation.

| Contaminant            | Summary of Statistical Evaluation of Trend *                                |
|------------------------|---|
| 1,1-dichloroethene     | no apparent trend   |
| cis 1,2-dichloroethene | concentrations probably decreasing ( $\alpha < 0.001$ )                     |
| benzene                | concentrations probably increasing ( $\alpha = 0.025$ )                     |
| vinyl chloride         | no apparent trend ( $\alpha = 0.064$ ) but concentrations may be increasing |

\* trend analysis done using the Mann-Kendall test;  $\alpha$  probability level set to 0.05

The decreasing concentrations of cis 1,2-dichloroethene support a conclusion that vinyl chloride concentrations might be increasing over time, as biodegradation of cis 1,2-dichloroethene under very anaerobic conditions is associated with dechlorination of cis 1,2-dichloroethene and production of vinyl chloride.

CEF-003-WP data show that only vinyl chloride and benzene are present in any appreciable concentration over the period of interest. Both are periodically detected in samples from this monitoring point. Several other organic contaminants may also be detected, although at concentrations less than their MCLs or GCTLs.

The two most recent samples from CEF-003-WP contained above-MCL concentrations of vinyl chloride, and the last sample contained 1.4 ug/L of benzene. It is probably not coincidental that three of the four most recent samples from 31S contained the highest concentrations of vinyl chloride reported from that well and the lowest concentrations of cis 1,2-dichloroethene since a sample from 1999. Increasing conversion of cis 1,2-dichloroethene to vinyl chloride around 31S may explain the rise in vinyl chloride concentrations in CEF-003-WP samples. It is not known if an increasing degree of reductive dechlorination around 31S is related to cessation of the air sparging remedial action hundreds of feet upgradient.

The state of Florida has a 2.4 ug/L surface water cleanup target level for vinyl chloride. The Florida Department of Environmental Protection has considered shallow groundwater concentrations near a surface water discharge area to be a reasonable estimation of the concentrations that might be present in the surface water. Conceptually, because of the high volatility of vinyl chloride and the irregular detection of vinyl chloride in CEF-003-WP samples, it is not expected that low-level vinyl chloride contamination in the groundwater at CEF-003-WP would translate into measurable amounts of vinyl chloride in the surface water. However, there may be some rationale for evaluating this possible concern in more detail. One option for such further evaluation is through a combination of (a) shallow groundwater sampling of CEF-003-WP on a more frequent basis (to determine if the recent concentrations of 12.9 ug/L and 5 ug/L in September 2009 and September 2010) are representative of overall groundwater quality conditions or are maximum values observed at the particular season when those samples were collected and (b) actual surface water sampling at an appropriate location and depth to evaluate if the shallow groundwater concentrations actually translate to unacceptable surface water concentrations. Note that the state surface water criterion for vinyl chloride is based on an assumed human exposure to the contaminant through fish ingestion. Based on my understanding of Site conditions, this exposure scenario is probably not an issue.

### Summary of this Review Memorandum

This memorandum focuses on the effectiveness of natural attenuation as a process for remediating groundwater at OU8, Site 3, NAS Cecil Field. Since late 2002, there has been no active groundwater remedial action at Site 3. Before that time, source area groundwater remedial action consisted of air sparging, on a continuous basis from May 1999 until May 2000 and on an intermittent basis from May 2000 until the summer of 2002. Air sparging would produce a more oxic environment, and would have caused air stripping of many of the principal contaminants (chlorinated ethenes and ethanes) at Site 3 but would be an unfavorable environment for reductive dechlorination of those contaminants. After cessation of the air sparging, subsurface conditions would have returned to a more anaerobic environment more conducive to reductive dechlorination.

Three areas of interest are evaluated in this memorandum. These three parts of Site 3 include the general source area, a monitoring well between the general source area and the surface water discharge area for shallow groundwater, and the groundwater in close proximity to the surface water discharge location.

In the general source area, contaminants of interest were defined for three monitoring wells where the most significant contamination is and has been present. Contaminant concentration trends were evaluated from the period from September 2002 through September 2010. This interval covers the time the air sparging remedial action has been inoperative.

Well 13S is the general source area well with the most significant levels of groundwater contamination. Contaminants of interest at 13S that were monitored in September 2002 were detected at relatively low to very low concentrations, reflecting the residual effects of the air sparging. In the following sample from February 2003, the concentrations of most contaminants of interest showed large concentration increases. Following that February 2003 spike in concentrations, concentrations of more chlorinated compounds such as 1,1,1-trichloroethane and trichloroethene showed some possible concentration decreases, although these decreases were not confirmed by statistical trend analysis. However, increasing concentrations of daughter products 1,1-dichloroethane and cis 1,2-dichloroethene are confirmed by nonparametric statistical trend analysis, implying increased reductive dechlorination of the parent compounds.

The efficacy of natural attenuation processes on reducing concentrations of 1,1,1-trichloroethane and trichloroethene at 13S cannot be reliably confirmed using the available data, because a trend of their decreasing concentrations is not confirmed by nonparametric statistical trend analysis. However, assuming a decreasing trend of these contaminants, and considering that trichloroethene currently exceeds its drinking-water standard by the greatest amount, a preliminary, optimistic estimation of the time needed for 13S trichloroethene concentrations to decrease to below the 3 ug/L Florida drinking-water standard exceeds 30 years. Using the Florida "natural attenuation default criteria" process, the current level of trichloroethene contamination exceeds a concentration that Florida would consider as potentially appropriate for a natural attenuation groundwater remedial action.

In addition to contamination by chlorinated ethene and ethane compounds at 13S, there is contamination by 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2-methyl naphthalene, and naphthalene. There is no indication from the monitoring data that concentrations of these contaminants are decreasing over time as a result of natural attenuation processes. These contaminants are probably less degradable than chlorinated ethenes and ethanes in an anaerobic subsurface geochemical environment and are less environmentally mobile than the chlorinated ethenes and ethanes. Thus, it is expected that natural attenuation will be less effective at remediation of these compounds.

At well 7S, the contaminants of interest include 1,1-dichloroethane, 1,1-dichloroethene, chloroethane, cis 1,2-dichloroethene, and trichloroethene. The pattern of 7S cis 1,2-dichloroethene and trichloroethene concentrations following cessation of air sparging differs from the conditions observed at 13S. There is considerable variation in 7S concentrations of these compounds. There is also no clear trend of declining concentrations of these compounds. Although the most recent sample from 7S contained cis 1,2-dichloroethene and trichloroethene at concentrations only marginally exceeding their drinking-water standards, it is unclear how effectively natural attenuation is acting to reduce their concentrations. There is also uncertainty about the effectiveness of natural attenuation for reduction of concentrations of the remaining contaminants of interest at 7S. The most recent 7S sample contained the highest 1,1-dichloroethane and chloroethane concentrations observed since air sparging ended, and a concentration of 1,1-dichloroethene that almost equaled the highest concentration seen since air sparging ended. There is no appreciable 1,1,1-trichloroethane in recent 7S samples, so increases of 1,1,1-trichloroethane degradation products cannot be attributed to more effective dechlorination of 1,1,1-trichloroethane in the post-sparging environment.

At well 6S, contaminants of interest include 1,1-dichloroethane, 1,1-dichloroethene, chloroethane, benzene, and vinyl chloride. At 6S, the concentrations of 1,1-dichloroethane are higher than those observed at either 13S or 7S. There are dramatic concentration fluctuations in the 6S concentrations of 1,1-dichloroethane. The concentration fluctuations appear to follow a similar pattern at 6S and at 7S, implying a hydrologic influence on the concentrations, such as shifting groundwater flow patterns. There is no apparent trend in 6S concentrations of 1,1-dichloroethane. There is also no apparent trend in either 1,1-dichloroethene or chloroethane concentrations in 6S samples since air sparging ended. The same comment applies to vinyl chloride, although the most recent 6S samples have higher vinyl chloride concentrations than data collected before 2008.

To summarize the evaluation of monitoring data from wells in the general source area, there are indications of enhanced reductive dechlorination of 1,1,1-trichloroethane and trichloroethene in the post-sparging environment at well 13S. Data suggest that natural attenuation processes will require more than 30 years to reduce 13S trichloroethene concentrations to below the 3 ug/L Florida drinking-water standard. The current 13S trichloroethene concentration exceeds the Florida natural attenuation default criterion, a maximum concentration for Florida considering natural attenuation to be potentially feasible as a groundwater remedial option. Several contaminants at 13S show no clear trend of declining concentrations in response to natural attenuation. Post-sparging data from wells 6S and 7S do not clearly establish that natural attenuation is effectively remediating groundwater contamination at those locations.

Well 28S is downgradient from the general source area. Contaminants of interest at this well include 1,1-dichloroethene, cis 1,2-dichloroethene, trichloroethene, and naphthalene. Each of these contaminants show declining concentration trends over time. For the two contaminants that exceed their respective drinking-water standards in the most recent 28S sample, statistical data analysis indicates that 1,1-dichloroethene should reach the drinking-water standard in about 4.5 years or less, and trichloroethene should reach its drinking-water standard in about 2.75 years.

Wells 31S and CEF-003-WP are located near the discharge area for shallow contaminated groundwater. Reductive dechlorination appears to be relatively robust in the general area of these wells, as there are substantive concentrations of cis 1,2-dichloroethene at 31S and inconsequential (typically non-detect) concentrations of cis 1,2-dichloroethene at CEF-003-WP, a short distance downgradient. Statistical trend analysis of data from 31S indicates probable decreasing concentrations of cis 1,2-dichloroethene, probable increasing concentrations of benzene, no apparent trend for 1,1-dichloroethene, and a possible trend of increasing concentrations of vinyl chloride. There may be a very slow decrease in 1,1-dichloroethene concentrations, as the most recent concentrations of this compound are slightly lower than concentrations observed prior to July 2007. The benzene contamination, although probably slowly increasing, is approximately 2 ug/L (between the Florida drinking-water standard of 1 ug/L and the Federal drinking-water standard of 5 ug/L). Benzene at the observed concentration is probably not a concern with respect to potential contaminant levels in the nearby stream.

CEF-003-WP data show that only vinyl chloride and benzene are present in any appreciable concentration over the period of interest. Both are periodically detected in samples from this monitoring point. Several other organic contaminants may also be detected, although at concentrations less than their MCLs or GCTLs.

The state of Florida has a 2.4 ug/L surface water cleanup target level for vinyl chloride and has considered shallow groundwater concentrations near a surface water discharge area to be a reasonable estimation of the concentrations that might be present in the surface water. It is not expected that low-level CEF-003-WP vinyl chloride contamination would translate into measurable amounts of vinyl chloride in the surface water. However, there may be some rationale for evaluating this possible concern in more detail. A recommended strategy for evaluating this concern is to combine more frequent CEF-003-WP sampling with in-stream sampling to evaluate actual surface water concentrations of vinyl chloride.

Please note that I have not included any suggestions or recommendations regarding possible changes to the remedial action and/or groundwater monitoring at Site 3. After you have reviewed this memorandum and perhaps received feedback from your management or outside parties regarding the concerns noted in this review, I will be glad to provide you with further technical support on Site 3 which could include suggestions or recommendations regarding the issues discussed in this memorandum.

### Figure 1. 13S Data

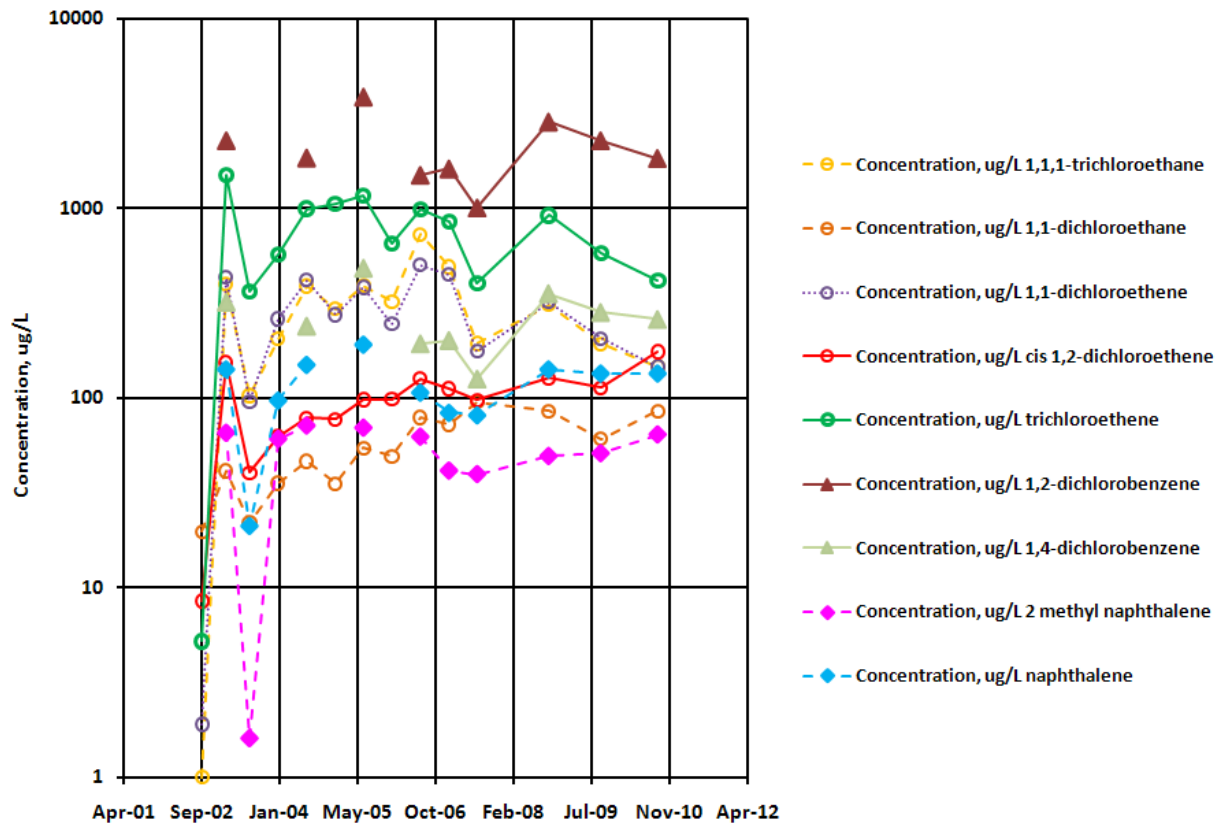




Figure 2. Trichloroethene and cis 1,2-Dichloroethene, Generalized  
Source Area Wells 7S and 13S

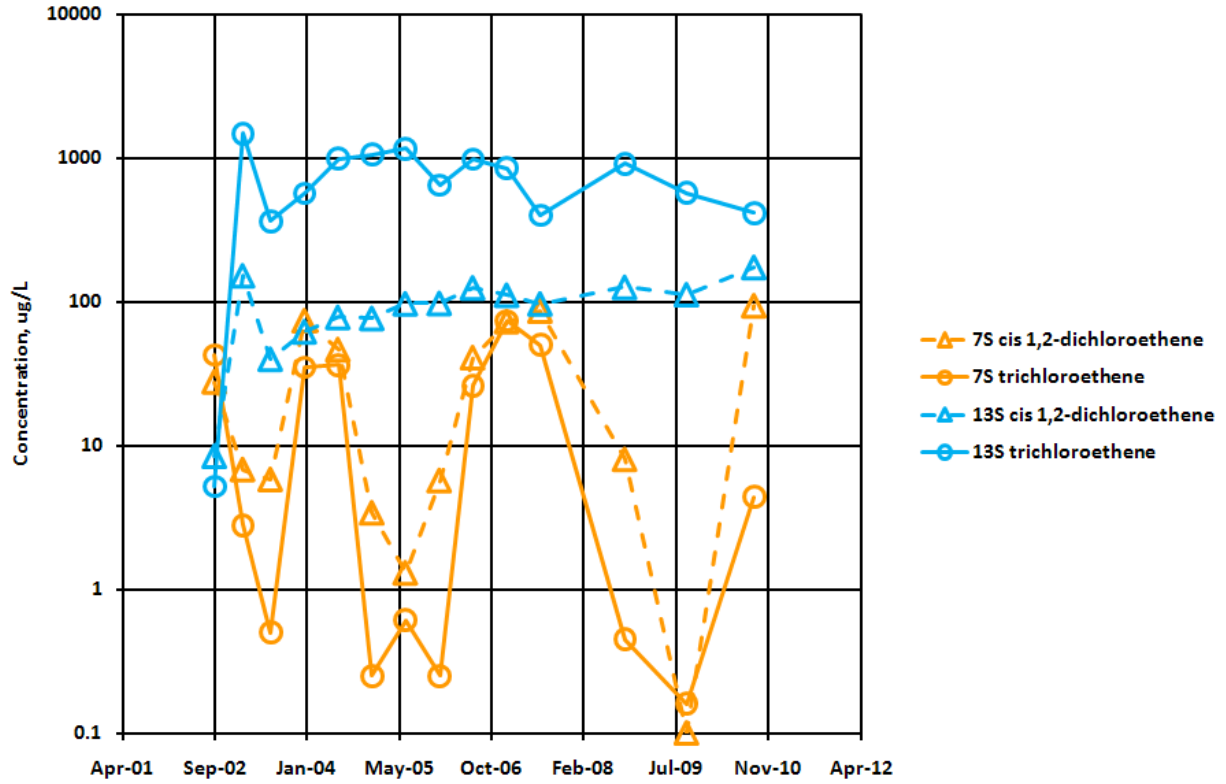


Figure 3a. 1,2-Dichloroethane, Generalized Source Area Wells

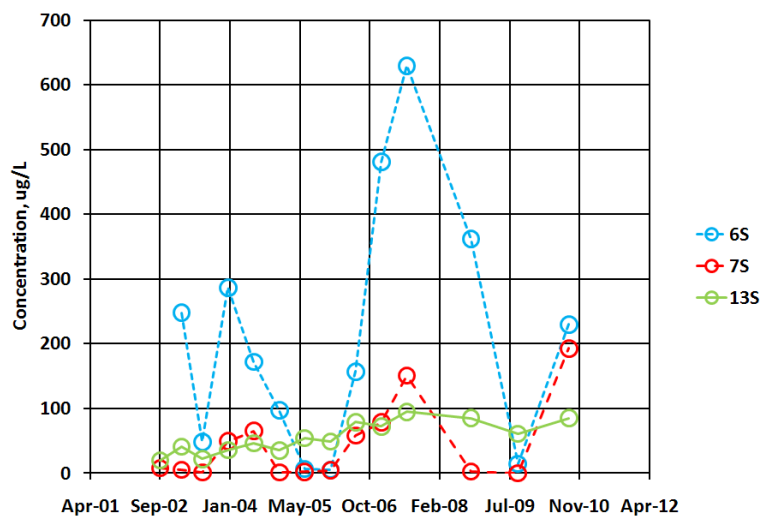


Figure 3b. 1,1-Dichloroethene, Generalized Source Area Wells

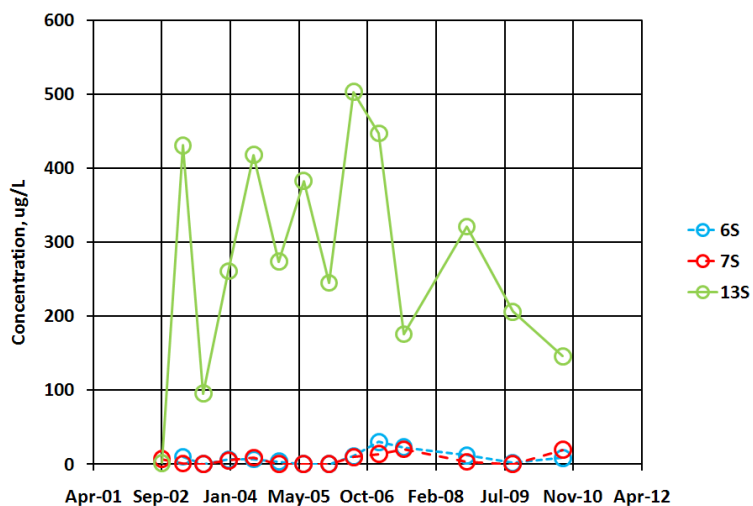


Figure 3c. Chloroethane, Generalized Source Area Wells

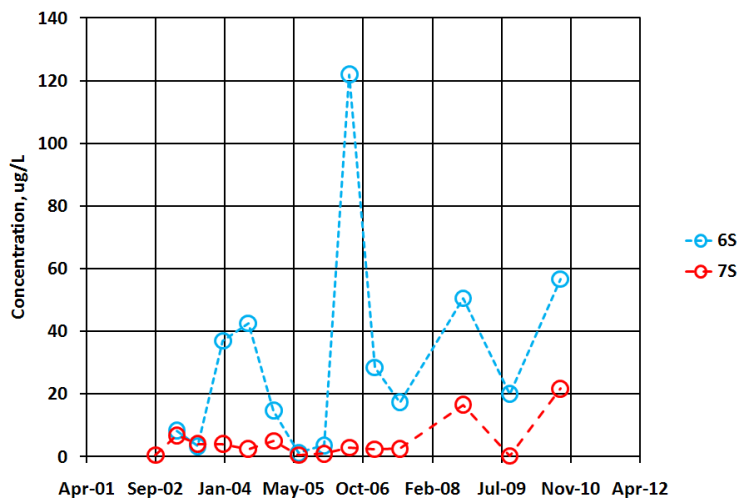


Figure 4. 28S Data

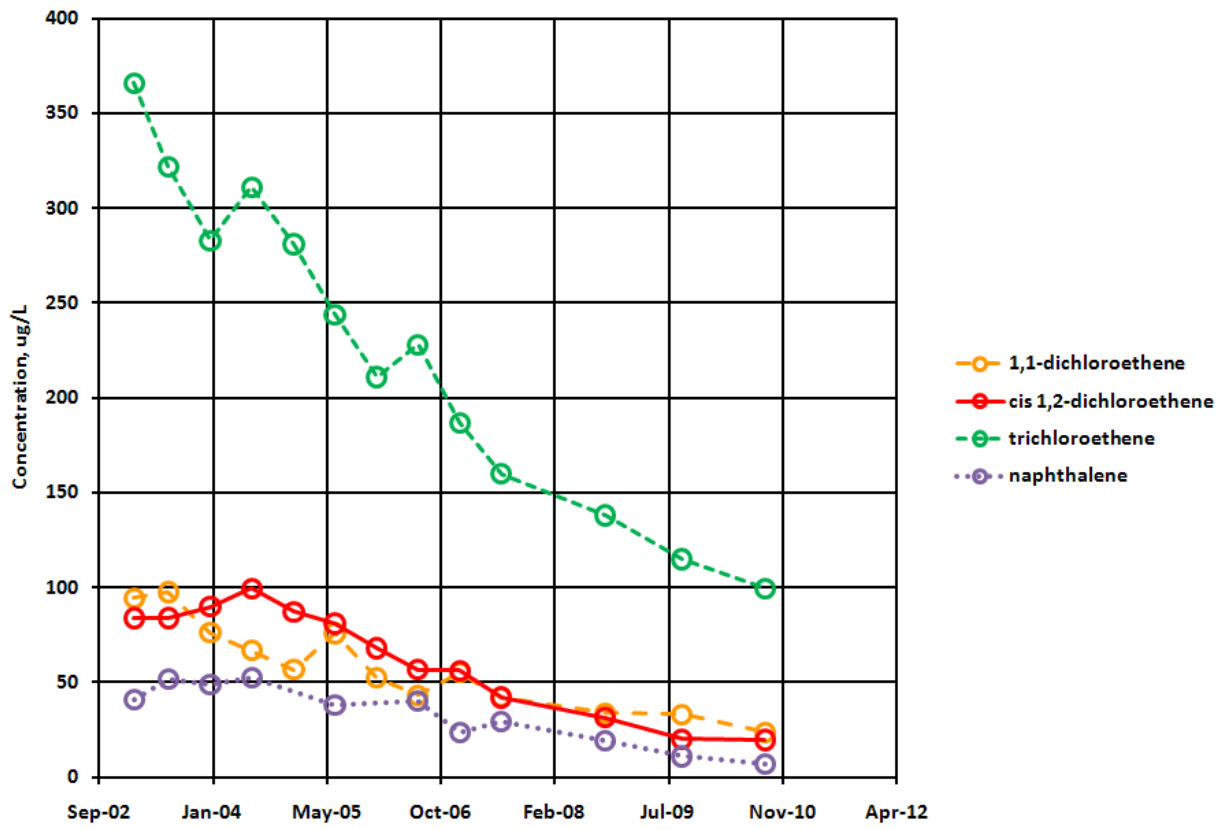


Figure 5. 1,1-Dichloroethene

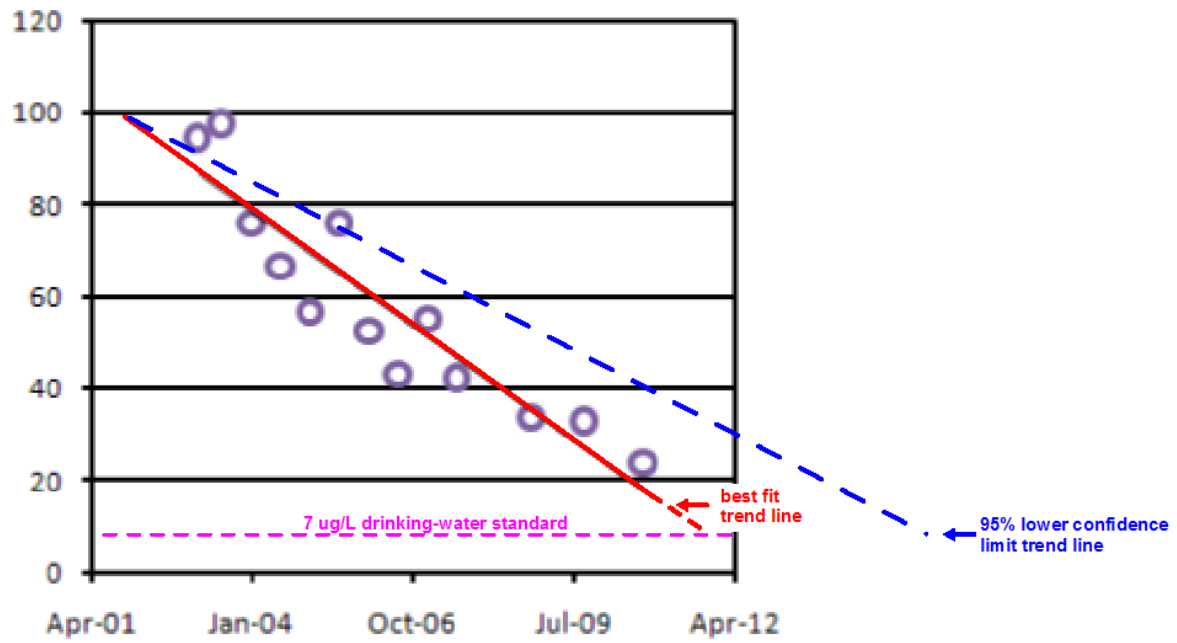
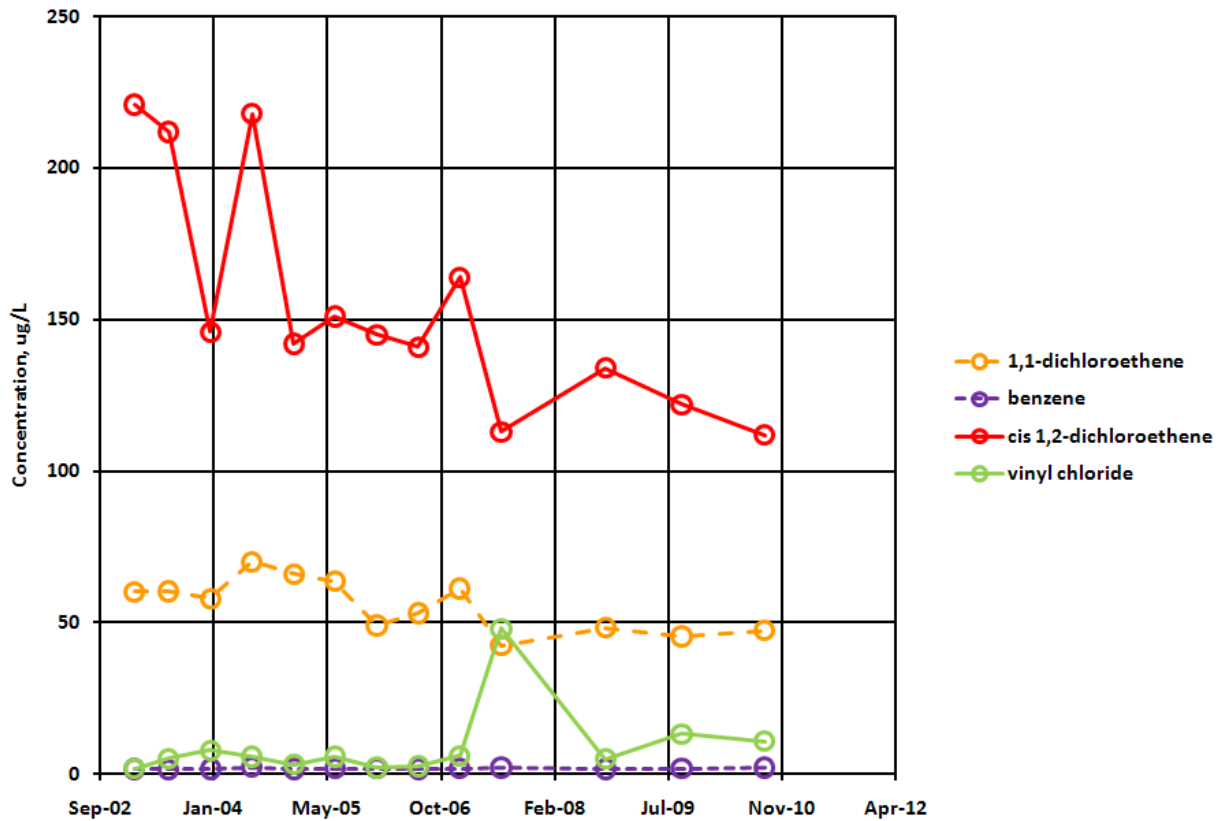


Figure 6. 31S Data



**ATTACHMENT 2**

**SITE 3 WELL POINT INVESTIGATION E-MAILS  
REGARDING PROPOSED EFFORT**

## Simcik, Robert

---

**From:** Simcik, Robert  
**Sent:** Friday, March 25, 2011 11:06 AM  
**To:** David.Grabka@dep.state.fl.us; 'Vaughn-Wright.Debbie@epamail.epa.gov'; 'Sanford, Art F CTR OASN (EI&E), BRAC PMO SE'; mark.e.davidson@navy.mil; stacin.martin@navy.mil; 'Jessica Keener'; Jonnet, Mark; Michael.Halil@CH2M.com  
**Subject:** Site 3 Pilot Test \_ additional Well Point sampling.  
**Attachments:** Site-03\_Well Point Additional Sampling.pptx

Team, in order to get some additional information for the proposed Site 3 Air Sparge Pilot Test design, we are going to collect some additional Well Point samples along Rowell Creek. The objective of the sampling is to verify the limits of contamination discharging into the creek to determine the required length of the air sparge curtain. Attached is a figure which identifies the approximate location of the samples to be collected. Our goal is to collect these samples within the next week or so in order to have the results for the May 11, 2011 BCT meeting. If you have any questions or comments please let us know.

Thanks, Rob

Robert Simcik P.E. | Project Manager  
Direct: 412.921.8163 | Main: 412.921.7090 | Fax: 412.921.4040  
[robert.simcik@tetrattech.com](mailto:robert.simcik@tetrattech.com)

Tetra Tech | Civil Engineering Group  
661 Andersen Drive Foster Plaza 7 | Pittsburgh, PA 15220 | [www.tetrattech.com](http://www.tetrattech.com)

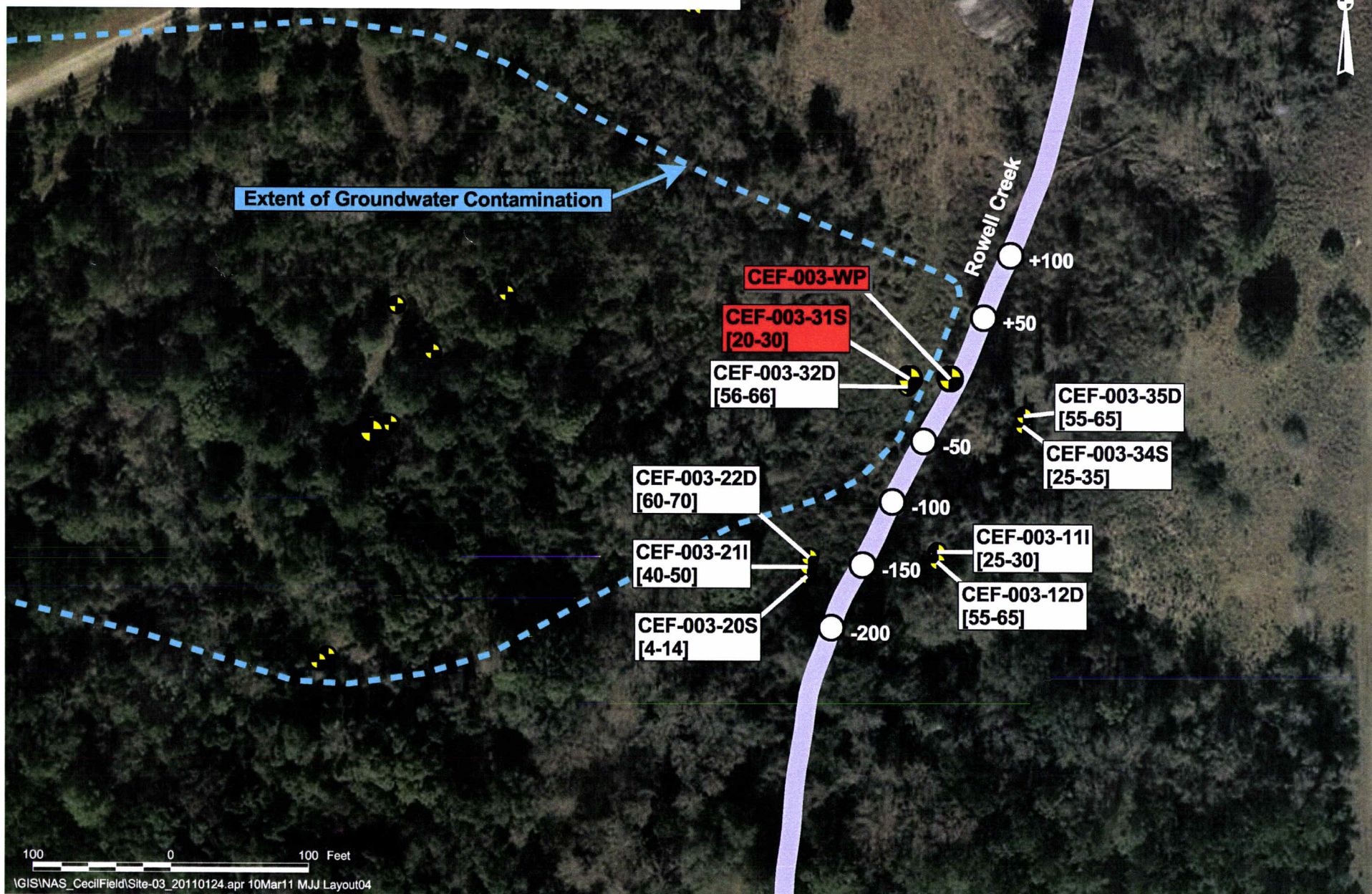
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Proposed Well Point (WP) sampling.

- 50 foot offsets from WP in LTM.
- Seven samples for VOCs only.

Note that the dashed Plume line is from the 1996 RI Report.





## Simcik, Robert

---

**From:** Simcik, Robert  
**Sent:** Wednesday, April 13, 2011 3:42 PM  
**To:** 'Sanford, Art F CTR OASN (EI&E), BRAC PMO SE'; 'Davidson, Mark E CIV OASN (EI&E), BRAC PMO SE'  
**Subject:** Additional Sampling at Site 3.  
**Attachments:** WP location at site 3 figure.jpg; VC result in Well Points..xlsx

To confirm:

We will conduct a vertical delineation in the creek at Site 3 to determine impact of creek bed sediments on select VOC detected at Site 3. We will collect four WP samples at two locations. The samples will be collected at the locations of the two highest VC detections during the WP evaluation (Locations CEF-003-WP-UP025 and CEF-003-WP-DOWN025) and the samples will be collected from the following screen intervals: 0.0' to 0.5' (top of well screen immediately below the bottom of the creek); 0.5' to 1.0'; 1.0' to 1.5'; and 2.0' to 2.5' (depth of original WP samples). The samples will be collected between 2 to 3 feet from edge of the creek.

Efforts will be conducted to try not to disturb the creek bed sediments (muck) prior and during sampling (which will not be easy). Will attempt to install all four interval depths at same time as not to create conduit for surface/creek water below the creek bed. A combination of PVC risers with 6 inch screens and steel rods with stainless steel 6 inch drive point well screens will be used depending on depth of sample (and if WP needs to be driven). The samples will be submitted for rush analysis to have results in time for the BCT meeting.

No additional up and down creek delineation sampling will be conducted during this effort.

Let me know if I captured this correctly and/or any suggestions or other samples. Currently planning to conduct the sampling effort on Tuesday 19<sup>th</sup> and results will be available NLT 25<sup>th</sup>.

Rob.

Robert Simcik P.E. | Project Manager  
Direct: 412.921.8163 | Main: 412.921.7090 | Fax: 412.921.4040  
[robert.simcik@tetratech.com](mailto:robert.simcik@tetratech.com)

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661 Andersen Drive Foster Plaza 7 | Pittsburgh, PA 15220 | [www.tetratech.com](http://www.tetratech.com)

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Rowell Creek

+50

Two old PVC WP




Two old PVC WP



+25

WP in creek




CEF-003-31S [20-30] 


CEF-003-32D [56-66] 

WP  
WP#2  
WP#1



-25

 CEF-003-35D [55-65]

 CEF-003-34S [25-35]

-50

20 0 20 Feet

| Location            | Sampling Date | Parameter      | GCTL | SWCTL_FW | Result | Qualifier |
|---------------------|---------------|----------------|------|----------|--------|-----------|
| CEF-003-WP-UP050    | 4/7/2011      | Vinyl Chloride | 1    | 2.4      | 56     |           |
| CEF-003-WP-UP025    | 4/7/2011      | Vinyl Chloride | 1    | 2.4      | 69     |           |
| CEF-003-WP-ORIGINAL | 4/6/2011      | Vinyl Chloride | 1    | 2.4      | 1.3    |           |
| CEF-003-DUP01       | 4/6/2011      | Vinyl Chloride | 1    | 2.4      | 2.7    |           |
| CEF-003-WP2-OLD     | 4/6/2011      | Vinyl Chloride | 1    | 2.4      | 32     |           |
| CEF-003-WP-DOWN025  | 4/7/2011      | Vinyl Chloride | 1    | 2.4      | 68     |           |
| CEF-003-WP-DOWN050  | 4/7/2011      | Vinyl Chloride | 1    | 2.4      | 5.5    |           |



Extent of Groundwater Contamination  
(From RI)

Rowell Creek



| 50' Upgradient | VC    |
|----------------|-------|
| SWCTL          | [2.4] |
| Edge 2.0'-2.5' | 56*   |

| 25' Upgradient     | VC      |
|--------------------|---------|
| SWCTL              | [2.4]   |
| Edge 2.0'-2.5'     | 69*/32* |
| In Creek 0.0'-0.5' | 8.7*    |
| 0.5'-1.0'          | 12*     |
| 1.0'-1.5'          | 61*     |
| 2.0'-2.5'          | 12*     |

| WP (Solutions) | VC     |
|----------------|--------|
| All 2.0'-4.0'  |        |
| SWCTL          | [2.4]  |
| 07/06          | 5.9*   |
| 01/07          | 0.5 U  |
| 07/07          | 0.34 U |
| 10/08          | 0.3 U  |
| 09/09          | 12.9*  |
| 09/10          | 5.0*   |

| Well Point     | VC         |
|----------------|------------|
| SWCTL          | [2.4]      |
| WP#2 2.0'-2.5' | 32*        |
| WP 2.0'-2.5'   | 1.3 I/2.7* |
| WP resample    | 45*        |

| 25' Downgradient   | VC     |
|--------------------|--------|
| SWCTL              | [2.4]  |
| Edge 2.0'-2.5'     | 68*    |
| In Creek 0.0'-0.5' | 0.25 U |
| 0.5'-1.0'          | 59*    |
| 1.0'-1.5'          | 4.2*   |
| 2.0'-2.5'          | 57*    |

| 50' Downgradient VC |       |
|---------------------|-------|
| SWCTL               | [2.4] |
| Edge 2.0'-2.5'      | 5.5*  |



\\GIS\NAS\_CecilField\Site-03\_20110124.apr 14Jun11 MJJ Layout

Legend

- Proposed DPT
- Monitoring Well
- Creek Sample Location

Location based on WP  
 Edge - sampled at creek water edge  
 In Creek - sampled 2' to 3' into creek water from Bank  
 SWCTL - surface water criteria  
 Vinyl Chloride result (ug/L)  
 \* indicates SWCTL exceeded  
 Yellow - sampled April 6 - 7, 2011  
 No shading - sampled April 19, 2011  
 Sample depth - screen top below surface water or ground surface for Edge samples

| 25' Upgradient     | VC     |
|--------------------|--------|
| SWCTL              | [2.4]  |
| Edge 2.0'-2.5'     | 69/32* |
| In Creek 0.0'-0.5' | 8.7    |

CEF-003-31S [20-30]  
 CEF-003-32D [56-66]

CEF-003-35D [55-65]  
 CEF-003-34S [25-35]

CEF-003-22D [60-70]  
 CEF-003-21I [40-50]  
 CEF-003-20S [4-14]  
 CEF-003-11I [25-30]  
 CEF-003-12D [55-65]

**ATTACHMENT 3**

**SITE 3 WELL POINT INVESTIGATION RESULTS, PRESENTATION,  
AND FIELD PAPERWORK BACKUP**



# Site 3 Well Point Investigation



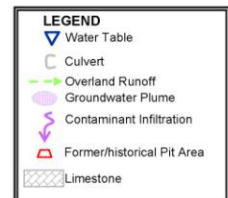
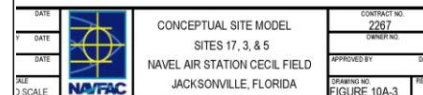
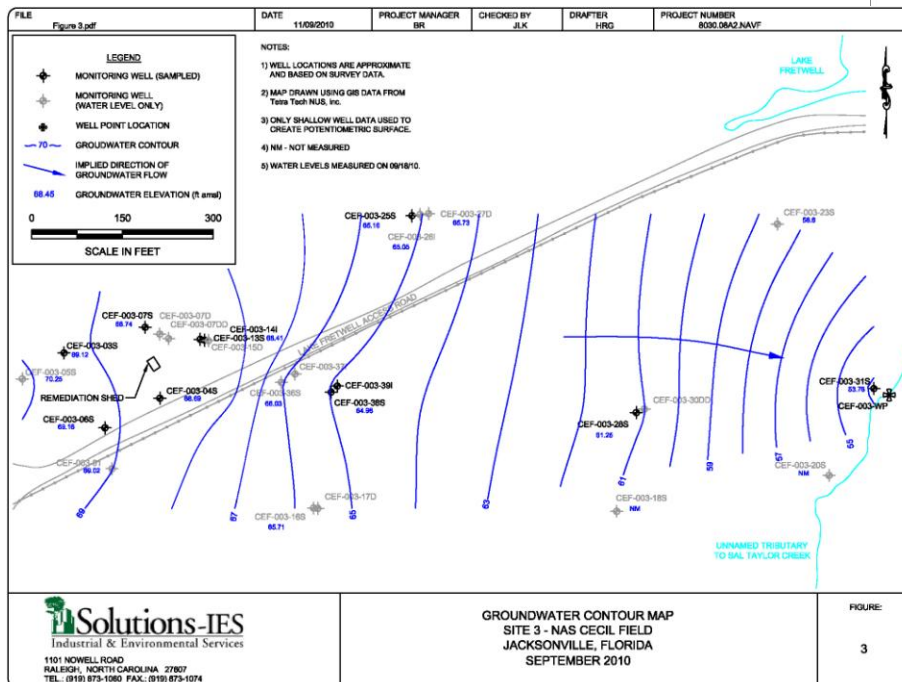
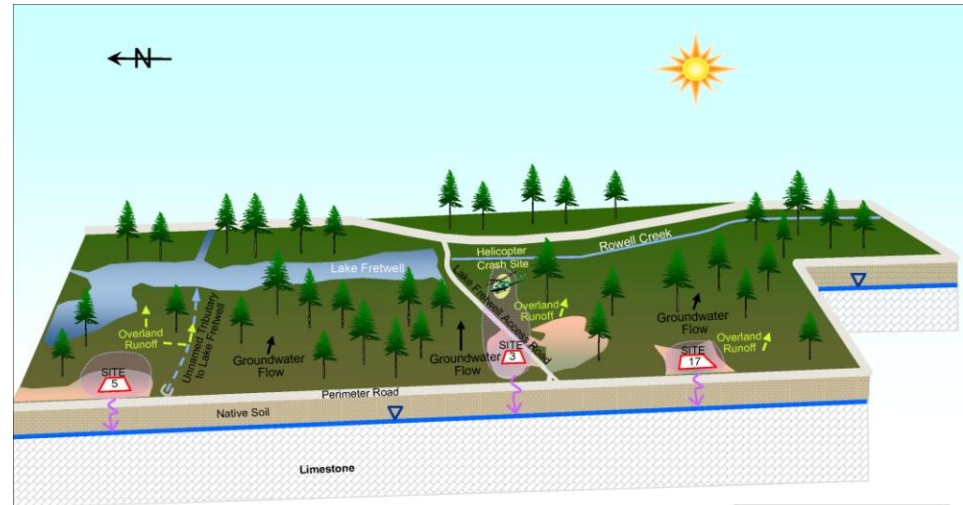
Cecil Field  
May 2011 BCT Meeting  
Jacksonville, FL



# Introduction

Issue: VC was confirmed in the Site 3 LTM Well Point. September 2009 and 2010 events.

Action: Feb-11 BCT decision to evaluate AS pilot test as option to address discharge to Rowell Creek.



Surface Water: If any COC concentration in the surface water/groundwater interface well point is greater than the SWCTLs, then resample to verify the exceedance. If the exceedance is verified, then the BCT takes appropriate actions to mitigate adverse impact on Rowell Creek and downgradient receptors (expanding the OU boundary and monitoring network, or taking a response action).



| CEF-003-28S<br>[20-30] | 07/06 | 01/07 | 07/07  | 10/08  | 09/09  | 09/10  |      |
|------------------------|-------|-------|--------|--------|--------|--------|------|
| BENZENE                | 2.5 U | 0.5 U | 0.2 U  | 0.8 U  | 0.8 U  | 0.21 U | [1]  |
| 1,1-DICHLOROETHENE     | 43.1* | 55.3* | 42.3*  | 33.7*  | 33.0*  | 23.7*  | [7]  |
| CARBON TETRACHLORIDE   | 2.5 U | 0.5 U | 0.29 U | 0.22 U | 0.44 U | 0.34 U | [3]  |
| CHLOROETHANE           | 5.0 U | 1.0 U | 0.46 U | 0.48 U | 0.96 U | 0.51 U | [12] |
| TRICHLOROETHENE        | 228*  | 187*  | 160*   | 138*   | 115*   | 99.4*  | [3]  |
| CIS-1,2-DICHLOROETHENE | 56.6  | 56.1  | 41.9   | 31.4   | 20.1   | 19.5   | [70] |
| VINYL CHLORIDE         | 2.5 U | 0.5 U | 0.34 U | 0.6 U  | 0.6 U  | 0.28 U | [1]  |

| CEF-003-31S<br>[20-30] | 07/06 | 01/07  | 07/07  | 10/08  | 09/09  | 09/10  |      |
|------------------------|-------|--------|--------|--------|--------|--------|------|
| BENZENE                | 1.7*  | 1.8 F* | 2.1*   | 1.7 I* | 1.8 I* | 2.1*   | [1]  |
| 1,1-DICHLOROETHENE     | 53.1* | 61.2*  | 42.4*  | 48.3*  | 45.5*  | 47.4*  | [7]  |
| CARBON TETRACHLORIDE   | 0.5 U | 1.0 U  | 0.29 U | 0.22 U | 0.44 U | 0.34 U | [3]  |
| CHLOROETHANE           | 1.0 U | 2.0 U  | 0.46 U | 0.48 U | 0.96 U | 0.51 U | [12] |
| TRICHLOROETHENE        | 0.5 U | 1.0 U  | 0.38 U | 0.64 U | 0.64 U | 0.24 U | [3]  |
| CIS-1,2-DICHLOROETHENE | 141*  | 164*   | 113*   | 134*   | 122*   | 112*   | [70] |
| VINYL CHLORIDE         | 2.6*  | 6.0*   | 48*    | 5.0*   | 13.3*  | 10.9*  | [1]  |

| CEF-003-WP<br>[NA]     | 07/06  | 01/07 | 07/07  | 10/08  | 09/09  | 09/10  |      |
|------------------------|--------|-------|--------|--------|--------|--------|------|
| BENZENE                | 1.4*   | 0.5 U | 0.2 U  | 0.4 U  | 0.4 U  | 1.4*   | [1]  |
| 1,1-DICHLOROETHENE     | 1.5    | 0.5 U | 2.5 U  | 0.24 U | 11.4   | 20.5   | [70] |
| CARBON TETRACHLORIDE   | 0.5 U  | 0.5 U | 0.29 U | 0.22 U | 0.22 U | 0.34 U | [3]  |
| CHLOROETHANE           | 28.1   | 2.8   | 0.46 U | 0.48 U | 0.48 U | 26.9*  | [12] |
| TRICHLOROETHENE        | 0.5 U  | 0.5 U | 0.38 U | 0.32 U | 0.32 U | 0.24 U | [3]  |
| CIS-1,2-DICHLOROETHENE | 0.50 U | 0.5 U | 0.28 U | 0.2 U  | 0.79 I | 0.32 U | [70] |
| VINYL CHLORIDE         | 5.9*   | 0.5 U | 0.34 U | 0.3 U  | 12.9*  | 5.0*   | [1]  |

LAKE FRETWELL

ROWELL CREEK

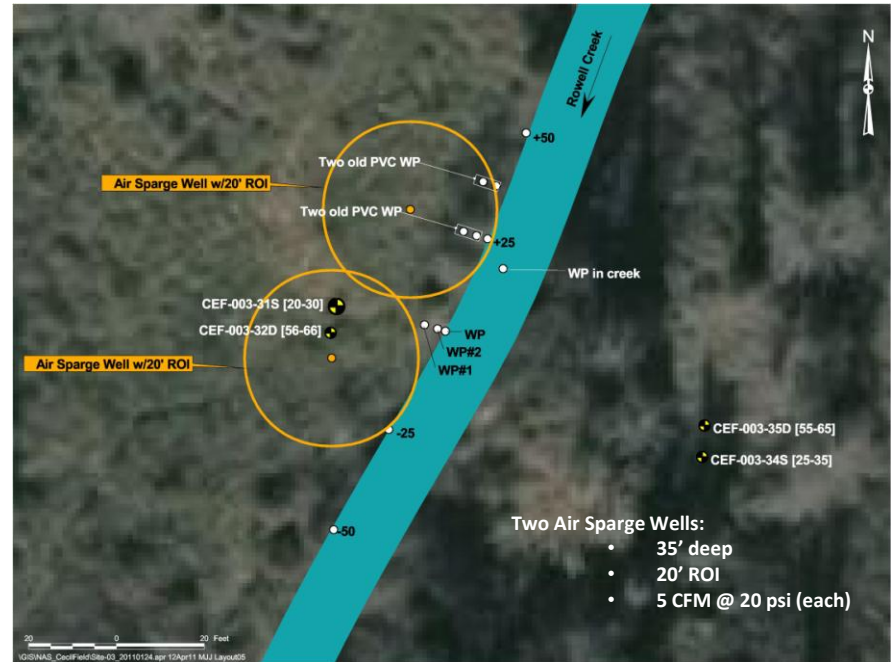


200 0 200 Feet



## Options associated with AS system included:

- Repairing Site 3 existing system and running air transfer line to treatment area.
- Running electric to treatment area and installation of smaller system.
- Solar powered system.



Evaluation required confirmation of discharge limits to determine length of air sparge curtain. Solar powered option only feasible/cost effective with limited number of AS wells.

Proposed additional WP sampling to verify limits of discharge to creek.



The proposed Well Point (WP) sampling plan sent to Team identified:

- 50 foot offsets from WP in LTM.
- Seven samples for VOCs only.

The proposed sampling plan was modified slightly based on field observations (old PVC stickup WPs) and level of effort to install and sample the WPs.

- The original WP location was resampled to confirm exceedence.
- Sampled the PVC well point (WP#2) install by Chapelle in 1997 at the “original location”.
- Additional samples were also collected at 25’ up and down stream.
- Four samples (+100, -100, -150, and -200) were not collected during first round pending quick turn results.



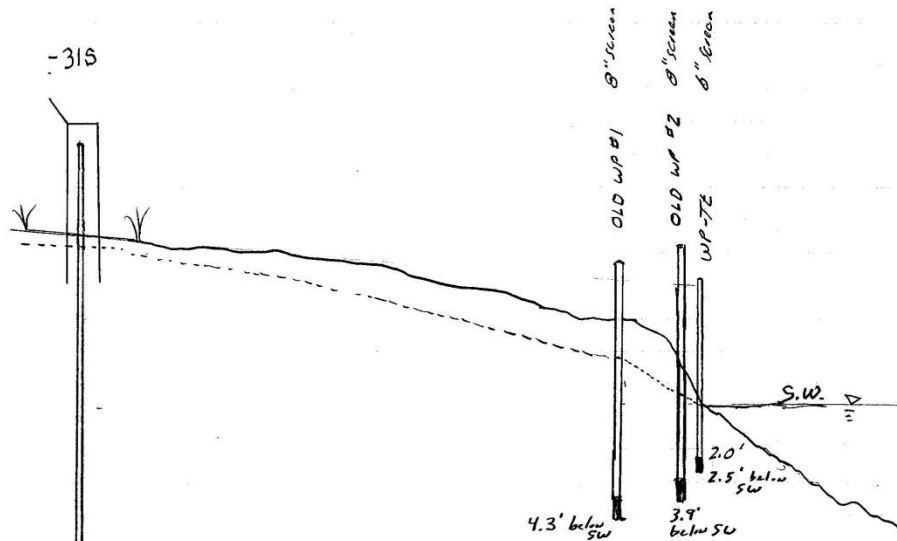
## Revised Sampling

- Six samples collected
- +50, +25, WP, -25, -50, and old PVC pipe #2





|  |            |                |                     |
|--|------------|----------------|---------------------|
| CLIENT   |            | JOB NUMBER     |                     |
| SUBJECT <i>Cecil Field Site 3 Well Point Investigation</i> |            |                |                     |
| BASED ON <i>Scale: 1" = 5'; H&amp;V</i>                    |            | DRAWING NUMBER |                     |
| BY <i>RS</i>   | CHECKED BY | APPROVED BY    | DATE <i>4/12/11</i> |



20' b/s

30' b/s











Sampling Setup



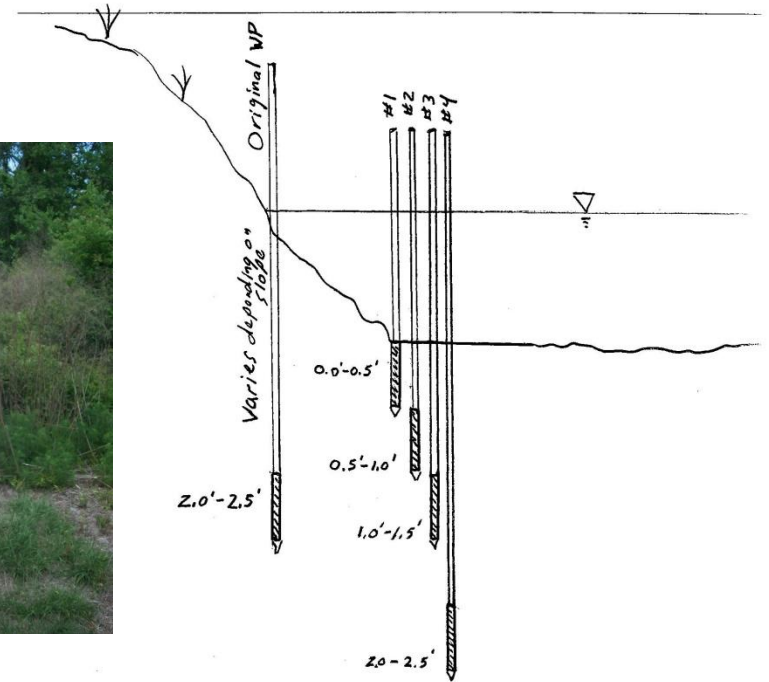
Results identified VC exceedances in all WP samples, others parameters detected less than GCTL/SWCTL or ND

### First Round Vinyl Chloride Results

| LOCATION    | SAMPLE DATE | VINYL CHLORIDE (ug/L) |          |        |
|-------------|-------------|-----------------------|----------|--------|
|             |             | GCTL                  | SWCTL_FW | RESULT |
| WP-UP050    | 4/7/2011    | 1                     | 2.4      | 56     |
| WP-UP025    | 4/7/2011    | 1                     | 2.4      | 69     |
| WP-ORIGINAL | 4/6/2011    | 1                     | 2.4      | 1.3    |
| DUP01       | 4/6/2011    | 1                     | 2.4      | 2.7    |
| WP2-OLD     | 4/6/2011    | 1                     | 2.4      | 32     |
| WP-DOWN025  | 4/7/2011    | 1                     | 2.4      | 68     |
| WP-DOWN050  | 4/7/2011    | 1                     | 2.4      | 5.5    |

Upon reviewing results with Navy, decision made to conduct 2<sup>nd</sup> round of sampling, objective was to:

- Verify and/or determine if VC is decreasing before discharge into Creek (Vertical Delineation Test).
- Verify low detection at original WP location (LTM sample location).
- Verify maximum VC detected during 1st round testing (WP-UP025) for Vertical Delineation Test.
- Quick turn to have results for May BCT meeting.



## Vertical Delineation Test.

- Test conducted at the two highest VC results (+25 and -25 feet from Original WP location).
- Four well points with 6-inch screens installed to depths of 0.0'-0.5'; 0.5'-1.0'; 1.0'-1.5'; and 2.0'-2.5'
- Wells developed and then sampled for select VOCs.

## Also collected samples from:

- 25UP (confirm vertical test location result)
- Original WP (check low detection)



# Vinyl Chloride Rowell Creek Results

| LOCATION     | SAMPLE DATE | VINYL CHLORIDE (ug/L) |          |          |
|--------------|-------------|-----------------------|----------|----------|
|              |             | GCTL                  | SWCTL_FW | RESULT   |
| WP-UP050     | 4/7/2011    | 1                     | 2.4      | 56       |
| WP-UP025     | 4/7/2011    | 1                     | 2.4      | 69       |
| WP-UP25-RS   | 4/19/2011   | 1                     | 2.4      | 32       |
| WP-UP25-0005 | 4/19/2011   | 1                     | 2.4      | 8.7      |
| WP-UP25-0510 | 4/19/2011   | 1                     | 2.4      | 12       |
| WP-UP25-1015 | 4/19/2011   | 1                     | 2.4      | 61       |
| WP-UP25-2025 | 4/19/2011   | 1                     | 2.4      | 12       |
| WP-DUP01     | 4/19/2011   | 1                     | 2.4      | 12       |
| WP-ORIGINAL  | 4/6/2011    | 1                     | 2.4      | 1.3      |
| DUP01        | 4/6/2011    | 1                     | 2.4      | 2.7      |
| WP-ORG-RS    | 4/19/2011   | 1                     | 2.4      | 45       |
| WP2-OLD      | 4/6/2011    | 1                     | 2.4      | 32       |
| WP-DOWN025   | 4/7/2011    | 1                     | 2.4      | 68       |
| WP-DN25-0005 | 4/19/2011   | 1                     | 2.4      | 0.25   U |
| WP-DN25-0510 | 4/19/2011   | 1                     | 2.4      | 59       |
| WP-DN25-1015 | 4/19/2011   | 1                     | 2.4      | 4.2      |
| WP-DN25-2025 | 4/19/2011   | 1                     | 2.4      | 57       |
| WP-DOWN050   | 4/7/2011    | 1                     | 2.4      | 5.5      |

1<sup>st</sup> round results have yellow background

## 2nd round results:

- WP-ORG did not verify initial low level result, 2<sup>nd</sup> round result similar to other locations sampled on the bank of Rowell Creek
- UP025:
  - 1<sup>st</sup> round maximum VC, 2<sup>nd</sup> round about ½ 1<sup>st</sup> round VC but still exceeding SWCTL.
  - Possible reduction of VC toward discharge into creek, but 0.0'-0.5' still above SWCTL.
- DOWN25:
  - VC non-detect at 0.0'-0.5' interval, but 0.5'-1.0' interval higher than interval immediately below it (results seem to fluctuate in the various zones).



**Legend**

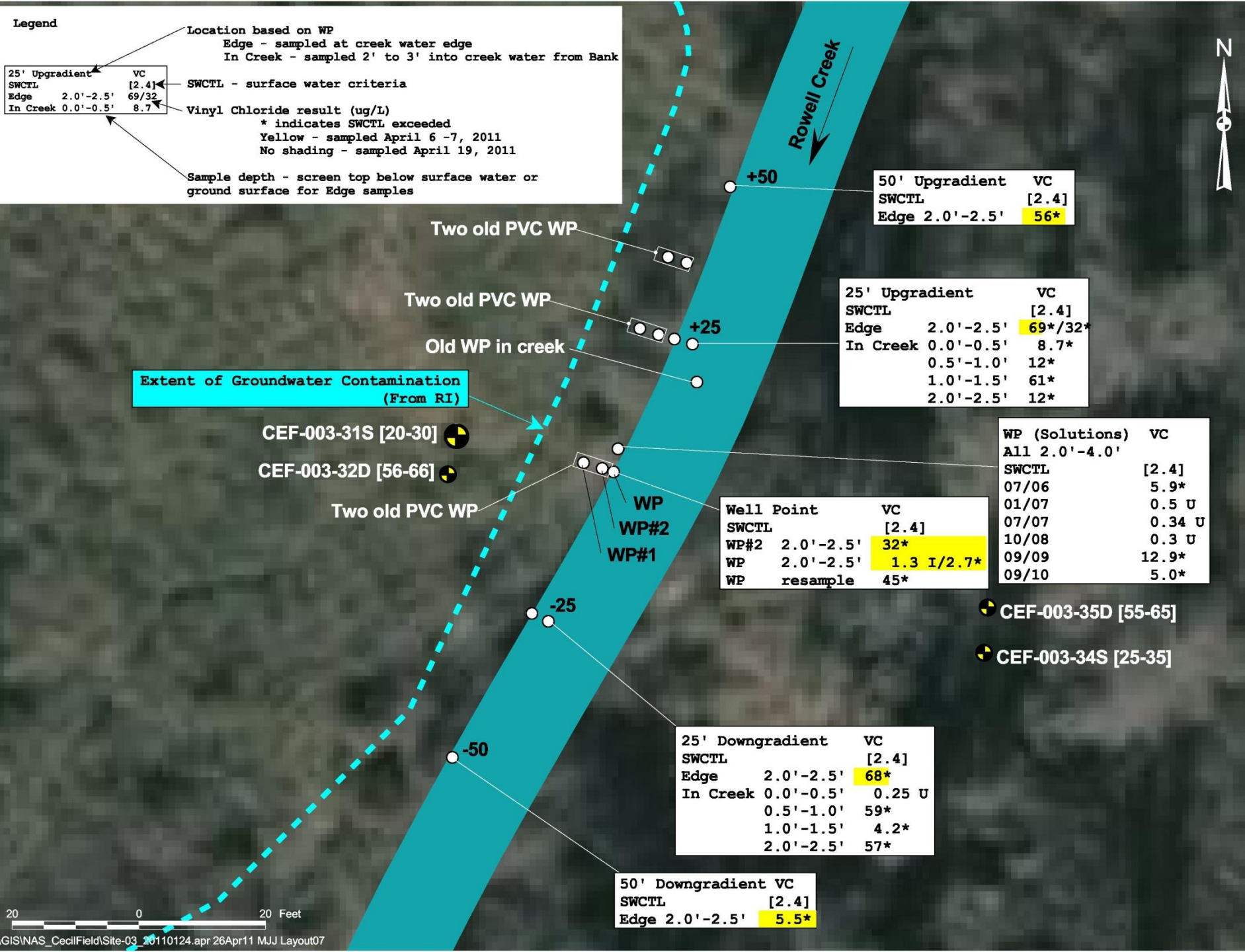
Location based on WP  
 Edge - sampled at creek water edge  
 In Creek - sampled 2' to 3' into creek water from Bank

|                    |       |
|--------------------|-------|
| 25' Upgradient     | VC    |
| SWCTL              | [2.4] |
| Edge 2.0'-2.5'     | 69/32 |
| In Creek 0.0'-0.5' | 8.7   |

SWCTL - surface water criteria

Vinyl Chloride result (ug/L)  
 \* indicates SWCTL exceeded  
 Yellow - sampled April 6 -7, 2011  
 No shading - sampled April 19, 2011

Sample depth - screen top below surface water or ground surface for Edge samples



Extent of Groundwater Contamination  
(From RI)

CEF-003-31S [20-30]

CEF-003-32D [56-66]

Two old PVC WP

WP  
WP#2  
WP#1

| Well Point     | VC         |
|----------------|------------|
| SWCTL          | [2.4]      |
| WP#2 2.0'-2.5' | 32*        |
| WP 2.0'-2.5'   | 1.3 I/2.7* |
| WP resample    | 45*        |

| 25' Upgradient     | VC      |
|--------------------|---------|
| SWCTL              | [2.4]   |
| Edge 2.0'-2.5'     | 69*/32* |
| In Creek 0.0'-0.5' | 8.7*    |
| 0.5'-1.0'          | 12*     |
| 1.0'-1.5'          | 61*     |
| 2.0'-2.5'          | 12*     |

| WP (Solutions) | VC     |
|----------------|--------|
| All 2.0'-4.0'  |        |
| SWCTL          | [2.4]  |
| 07/06          | 5.9*   |
| 01/07          | 0.5 U  |
| 07/07          | 0.34 U |
| 10/08          | 0.3 U  |
| 09/09          | 12.9*  |
| 09/10          | 5.0*   |

CEF-003-35D [55-65]

CEF-003-34S [25-35]

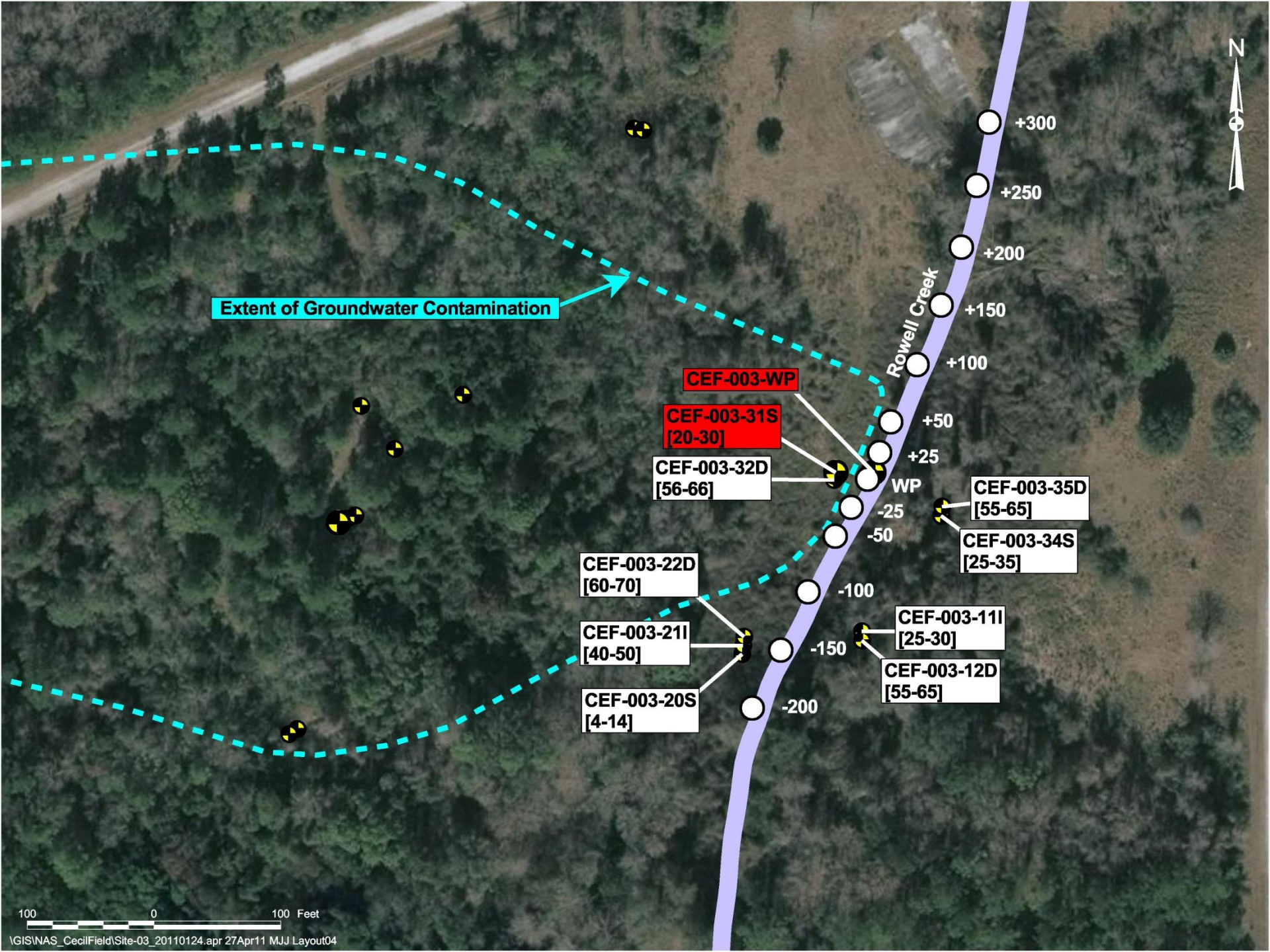
| 25' Downgradient   | VC     |
|--------------------|--------|
| SWCTL              | [2.4]  |
| Edge 2.0'-2.5'     | 68*    |
| In Creek 0.0'-0.5' | 0.25 U |
| 0.5'-1.0'          | 59*    |
| 1.0'-1.5'          | 4.2*   |
| 2.0'-2.5'          | 57*    |

| 50' Downgradient | VC    |
|------------------|-------|
| SWCTL            | [2.4] |
| Edge 2.0'-2.5'   | 5.5*  |

# Path Forward Options

- Verify Vertical Delineation Test using passive sampling with diffusion sampler.
  - Collect sample directly above creek bottom (+0.5' to 0.0' interval in addition to the previous intervals directly below creek bottom).
  - If sample from directly above creek bottom is below SWCTLs then no “issue” exists.
- Delineate extent of VC contamination along creek using WPs.
  - Use same WP sampling strategy (2.0' – 2.5' interval installed at edge of creek).
  - Sample every 50' up and down gradient from last sample locations.
    - Collect three samples up and down gradient ( 100', 150', and 200') during first round.
    - Samples will be analyzed incrementally on quick turn bases until result below SWCTL.
    - One sample location below the SWCTL (as long as there are no other samples further up or down stream of that location) is adequate to determine limits of the VC potential discharge plume.
    - If the furthest up or down or both sample location during the first round still exceeds the SWCTL, then additional WP sampling will be conducted until the limits are established.
    - The samples will be analyzed for VC only.
  - Continue to evaluate AS option to address observed exceedances of VC in WP samples.





Site 3

4-6-11

|      |           |   |
|------|-----------|---|
| 1050 | Personnel | Dave S. Ewen                                |
|      |           | Rob Smith                                   |
|      | PPE       | Level "D"                                   |
|      | Weather   | Clear 72°F                                  |
|      | Obj       | Collect gw of select VOCs from creek & well |

1050 Had meetings at Flightstar & w/ Rusty of JAA earlier today.  
 Dave on site to get ready for days field activities. - Calibrating  
 YSI & turbidity meter. Both instruments rented from Field Env. Inst.  
 See ~~some~~ calibration sheet for both instruments. Both calibrated.

1125 For well points we are using a stainless steel well point that  
 is hand driven into the ground. This screen will be cleaning  
 per FDFP SOPs - H<sub>2</sub>O, H<sub>2</sub>O + Lignite & post grade Alcohol.  
 between points and before sampling begins. All H<sub>2</sub>O will  
 be contained & placed into Drum 3-46. This is a new drum

1137 Well points cleaned & ready for use

1421 Have placed metal rods at sample location

1422 Check white PVC well? near pair of wells along creek  
 bank. called 1<sup>st</sup> PVC well (#1) & the other (#2)

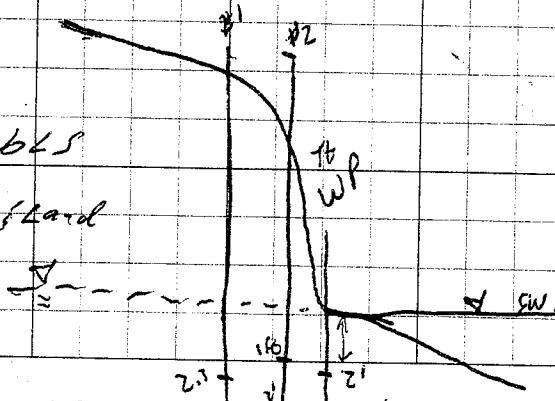
PVC Well (1) 9.94 TD  
 5.60 DTW  
 (H)  $\nwarrow$  ~ 5.6 rise above surface H<sub>2</sub>O  
 2.2 above ground

PVC Well (1) 3.70 ft above ground River  
 ~ 5.80 ft above surface H<sub>2</sub>O  
 5.80 DTW  
 9.88 TD

(i) 4.3 ft below ground w/ H<sub>2</sub>O  
 (ii) 3.88 ft below ground w/ H<sub>2</sub>O

Well Point driven at SW meets  
 the shore line.

WP driven to depth total of 2.5 bts  
 and 6" screen for Topowell  
 screen at 2' below surface water level



1530 Placement of well (~~WP~~ WP) based on UPPSAP & Placement of previous well point.

Existing WP #1 and #2. (#2 closer to creek) information on previous page

Installed WP at original sample location: Photo taken

Set up to sample WP and existing WP #2

Sample ID's will be:

TK Well Point: CEF-003-WP-Original

Existing PVC Apr #2: CEF-003-WP2-OLD

Based on walk of creek and further discussions on AS system proposal will also collect a sample 25' down gradient of original location.

So: Changes from E-mail Work Plan

- 1) Will collect a GW sample from Monitoring Well CEF-003-315
- 2) Will collect an additional sample 25' ~~down~~ up gradient of original location (e-mail work plan identifies every 50' up & down gradient).
- 3) Will collect a sample from existing well point installed by Solutions-Res.

Observation: There is an old PVC 1" pipe stained brown in the middle of the creek about 15' up gradient of original WP location.

Purging the WPs. Very black organic at beginning/start of purge, but cleared up pretty quickly. TK WP was very slow to recover (purged dry easily). Solutions Res PVC well does not purge dry - good clear up. Will sample just one first.



## WELLS SAMPLED TODAY

|    | <u>ID</u>           | <u>Begin</u> | <u>Sample Time</u>  |
|----|---------------------|--------------|---------------------|
| 1) | CEF-003-WP2-OLD     | 1500         | 1640                |
| 2) | CEF-003-WP-Original | 1530         | 1620                |
| 3) | CEF-003-DUP01       | = Dup of     | CEF-003-WP-ORIGINAL |
|    |                     |              | 1645                |

1704 Packed up & leaving. All samples are on ICE.  
 & have been since collection.

1715 Locked gates, site secure - off to Fed Ex  
 &

1830 AT Fed Ex shipping Cooler -  
 Samples Are RUSTY. Analysis  
 LAB Katahdin

April 7, 2011

Sunny, High 85°F

0700 Dave Picked up ice and additional supplies DS-Dave Siefken  
RS-Rob Simick

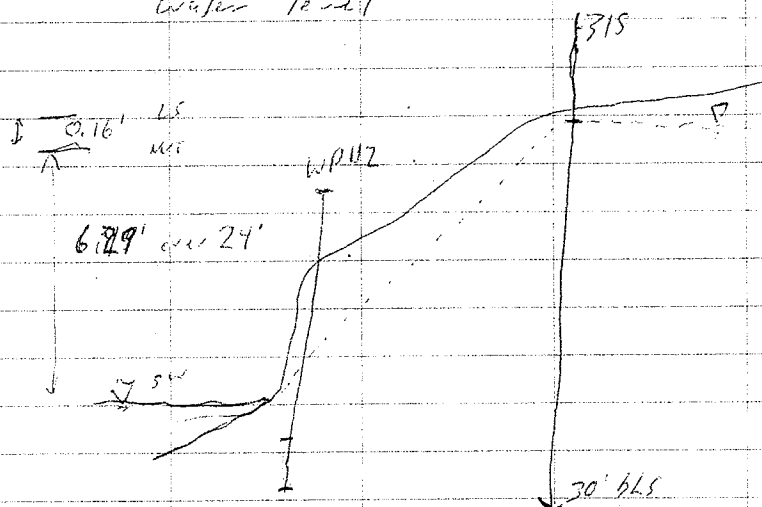
0800 Arrived at Site 3 and setup over CEF-003-31S.

The screen interval is 20'-30'

Total Depth(TD): 33.4' TOC — Casing 3.55' BLS to TOC

Water Level: 3.77' Static water Depth from TOC

Note this well is only 24' from edge of creek and TOC is about 10' above the creek water level



\* NOTE: PE tubing (existing) was 24' total length. Used existing tubing.

0845 Began purging CEF-003-31S

- Clear and de-aired well. Form filled out.

0910 Sample collected ID: CEF-003-31S

Will hold analysis pending evaluation of the results of the original well point location.

0920 Began preparation for sampling next well point.

Added Down gradient/down stream point @ 25' from original location.

CEF-003-WP-Down025

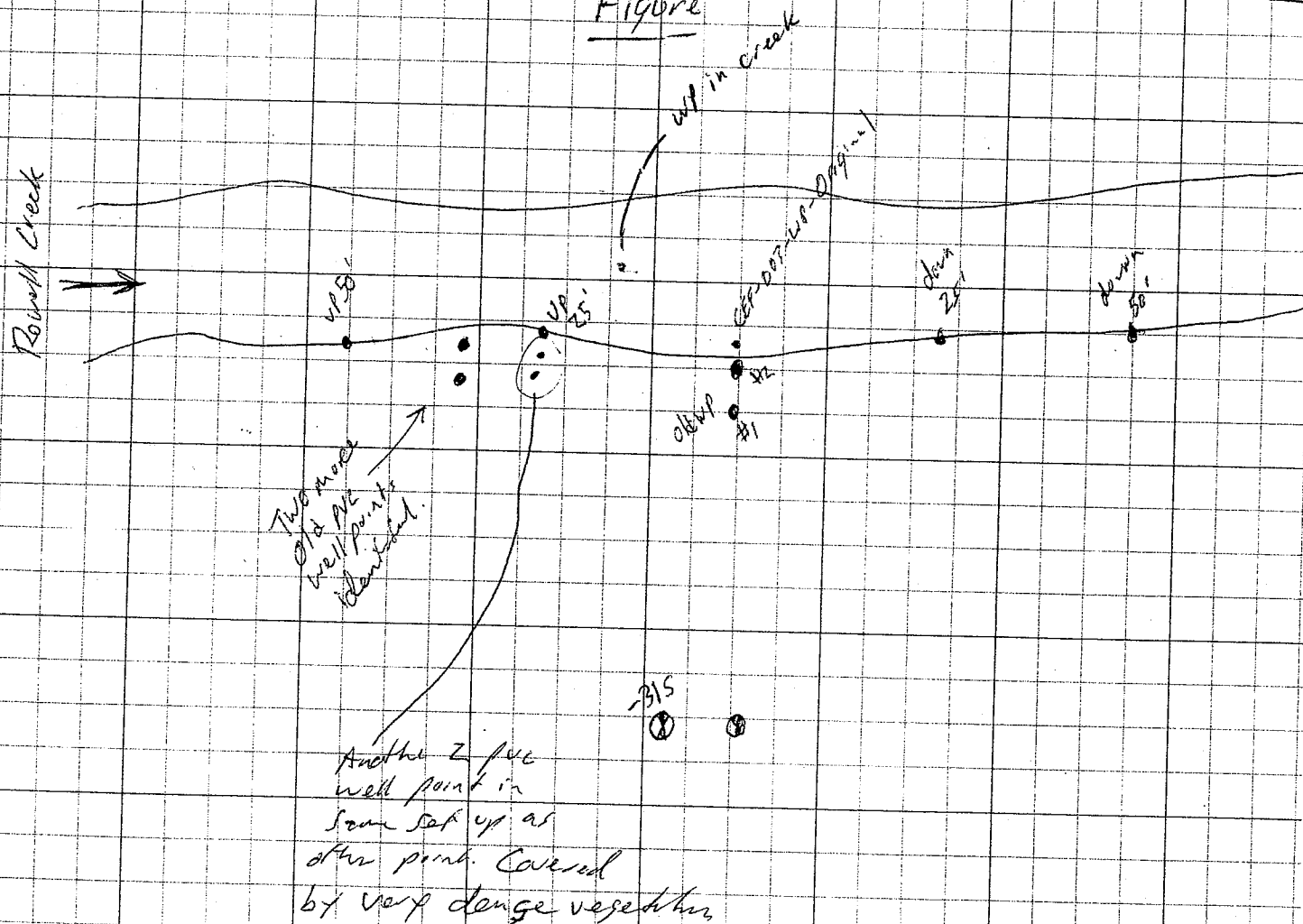
1000 Began purging Down 25' location. Initially the water was black and organic at beginning

- Not submit both 25' and 50' to stick w/ original plan.

Wells Sampled Today

| <u>Well ID</u>                              | <u>Began Purge</u> | <u>Sample Time</u> | <u>Comments</u>   |
|---|--------------------|--------------------|---|
| CEF-003-315                                 | 0845               | 0910               | Clear, down down 1 foot, good                                 |
| CEF-003-WP- <del>Down 025</del><br>Down 025 | 1000               | 1045               | black muck to start purge<br>clearing up rocky wells. Good!   |
| CEF-003-WP-Down 050                         | 1120               | 1140 *             | Well purged dry. Difficult<br>get good flow. * Poured longer. |
| CEF-003-WP-Up 050                           | 1230               | 1300               | 12:10 completed last vein<br>Same as other wells              |
| CEF-003-WP-Up 025                           | 1335               | 1410               | Same black in beginning, good<br>flow.                        |

Figure





- 1050 Set up at 50' down stream of original location.
- 1105 Drive WP at 50' location
- 1120 Began purging WP goes dry. Much more like original WP location. Very little volume in this well point setup.  
Purged dry approximately 8 times.
- 1140 Took turbidity, not enough volume to collect flow thru water quality parameters. Collected sample.
- 1220 Began prep. for WP 50' up gradient of original location.
- 1230 Installed WP. Went in very easily. No really hard zone identified but still about 1.5' below SW reported on about 1 foot.  
Purge just like the other WP locations with Ditch initially, purge dry, and then about 2 min able to pump and clearing up. Purged dry again.
- 1300 Collect Well point sample @ 50' up gradient
- 1335 Set up well point at 25' up gradient of original location and began purging. Very good flow. Well never went dry. Good turbidity on this well @ 15 NTU.  
Hard / soft / Hard. The WP went in same as the other wells, not sure why so soon. Water quality readings indicate it is definitely GW with no SW infiltration.
- 1410 Collected 25' up gradient / up stream sample  
CEF-003-WP-Up025
- 1425 Collecting water quality measurement at creek surface water for potential future use:  
Temp: 20.76 °C steady  
Condi: 0.169 m/m 0.156 m/m Steady  
D.O.: 108.6 % verified 9.65 m/m Steady  
PH: 6.93 pH  
ORP: -1.7 pHmv  
ORP: -151.9 o/p

- 1507 Packed up from today's activities Rob  
left ~ 1445. All samples are collected &  
I may need to return next week depending on  
lab analysis results.
- 1518 Through both gates, Locked & site secure  
heading for Bldg 536 to put IDW  
in bldg for storage.
- 1533 At Bldg 536 sealed 2 buckets bucket  
1 & Bucket 2 - put Drum labels on each  
bucket with ID of 3-46 1 of 2 & 2 of 2  
Will leave on haz spill pallet until we know  
Lab results. - Bldg 536 looks very clean  
Jeff doing a good job - HRC still in Hdging  
off to return Contractor pass
- 1548 Returned contractor pass for Rob & I  
off to Fed-Ex
- 1730 AT Fed Ex - Send cooler to Kotohadi  
for Rush analysis of select VOC  
see Chain-of-Custody for constituents.

END OF DAY

DS



|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  |                     |  |
|--|--|--|--|--|--|---|--|--|--|-----------------------------------|--|---|--|-------------------|--|---------------------|--|
| PROJECT NO:<br><b>112G02267</b>  |  | FACILITY:<br><b>Cecil Field / Site 3</b> |  | PROJECT MANAGER<br><b>Rob Simcik</b>                   |  | PHONE NUMBER<br><b>412-973-5809</b>         |  | LABORATORY NAME AND CONTACT:<br><b>Kathdin Lab</b> |  |                                   |  |   |  |                   |  |                     |  |
| SAMPLERS (SIGNATURE)<br><br><br>NOTE: Might not have all samples analyzed. Verify with PM prior to analysis. Only hold -315 do all well point (WP) samples immediately.  |  |  |  | FIELD OPERATIONS LEADER<br><b>DAVID SIEPTEN</b>        |  | PHONE NUMBER<br><b>412-334-7260</b>         |  | ADDRESS<br><b>600 Technology Way</b>               |  |                                   |  |   |  |                   |  |                     |  |
|  |  |  |  | CARRIER/WAYBILL NUMBER<br><b>8427. 1835-0447</b>       |  | CITY, STATE<br><b>Scarborough, ME 04074</b> |  |  |  |                                   |  |   |  |                   |  |                     |  |
| STANDARD TAT <input type="checkbox"/><br>RUSH TAT <input checked="" type="checkbox"/><br><input checked="" type="checkbox"/> 24 hr. <input type="checkbox"/> 48 hr. <input type="checkbox"/> 72 hr. <input type="checkbox"/> 7 day <input type="checkbox"/> 14 day |  |  |  | CONTAINER TYPE<br>PLASTIC (P) or GLASS (G)<br><b>G</b> |  | PRESERVATIVE<br>USED                        |  | TYPE OF ANALYSIS<br>* Select VOCs 8260B HCl        |  |                                   |  |   |  |                   |  |                     |  |
| DATE YEAR <b>2011</b>  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  |                     |  |
| TIME   |  | SAMPLE ID                                |  | LOCATION ID  |  | TOP DEPTH (FT)<br><i>Below Sediment</i>     |  | BOTTOM DEPTH (FT)<br><i>Below Sediment</i>         |  | MATRIX (GW, SO, SW, SD, QC, ETC.) |  | COLLECTION METHOD<br>GRAB (G)<br>COMP (C) |  | No. OF CONTAINERS |  | COMMENTS            |  |
| 1 0910   |  | CEF-003-31S                              |  | CEF-31S  |  | 2.0'  |  | 2.5'   |  | GW                                |  | G   |  | 3                 |  |                     |  |
| 2 1045   |  | CEF-003-WP-Down 050 -025'                |  | Down 050   |  | 2.0'  |  | 2.5'   |  | GW                                |  | G   |  | 3                 |  | ✓ Rush Analysis NOW |  |
| 3 1140   |  | CEF-003-WP-Down 050 -50'                 |  |  |  | 2.0'  |  | 2.5'   |  | GW                                |  | G   |  | 3                 |  | ✓ Rush Analysis NOW |  |
| 4 1300   |  | CEF-003-WP-Up 050 +50'                   |  |  |  | 2.0'  |  | 2.5'   |  | GW                                |  | G   |  | 3                 |  | ✓ Rush Analysis NOW |  |
| 5 1410   |  | CEF-003-WP-Up 025 +25'                   |  |  |  | 2.0'  |  | 2.5'   |  | GW                                |  | G   |  | 3                 |  | ✓ Rush Analysis NOW |  |
|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  | * Select VOCs       |  |
|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  | -1,1-DCE            |  |
|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  | -1,2-DCE            |  |
|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  | -1,4-DCE            |  |
|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  | Naph                |  |
|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  | TCE                 |  |
|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  | Cis-1,2-DCE         |  |
|  |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  | VC                  |  |
| 1. RELINQUISHED BY   |  |  |  | DATE<br><b>4-7-11</b>                                  |  | TIME<br><b>1733</b>                         |  | 1. RECEIVED BY                                     |  |                                   |  | DATE                                      |  | TIME              |  |                     |  |
| 2. RELINQUISHED BY   |  |  |  | DATE   |  | TIME  |  | 2. RECEIVED BY                                     |  |                                   |  | DATE                                      |  | TIME              |  |                     |  |
| 3. RELINQUISHED BY   |  |  |  | DATE   |  | TIME  |  | 3. RECEIVED BY                                     |  |                                   |  | DATE                                      |  | TIME              |  |                     |  |
| COMMENTS   |  |  |  |  |  |   |  |  |  |                                   |  |   |  |                   |  |                     |  |



|                              |                                |
|------------------------------|--------------------------------|
| SITE NAME: Site 3            | SITE LOCATION Cecil            |
| WELL NO: CEF-003-WP-Down 025 | SAMPLE ID: CEF-003-WP-Down 025 |
| DATE: 4-7-11                 |                                |

|                                       |   |  |  |   |
|---------------------------------------|---|--|--|---|
| WELL<br>DIAMETER (inches): <u>3/4</u> | TUBING<br>DIAMETER (inches): <u>1/4</u> | WELL SCREEN INTERVAL<br>DEPTH: <u>2.5</u> to <u>2.9</u> ft | STATIC DEPTH<br>TO WATER (feet): <u>NA</u> | PURGE PUMP TYPE<br>OR BAILER: <u>PP</u> |
|---------------------------------------|---|--|--|---|

(only fill out if applicable)

$$= ( \quad \text{feet} - \quad \text{feet} ) \times \quad \text{gallons/foot} = \quad \text{gallons}$$

(only fill out if applicable)

$$= \text{gallons} + (\text{gallons/foot} \times \text{feet}) + \text{gallons} = \text{gallons}$$

TOTAL VOLUME  
PURGED (gallons): 7.0

1045

**TUBING INSIDE DIA. CAPACITY (Gal./Ft.):** 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

**PURGING EQUIPMENT CODES:**    **B** = Bailer:    **BP** = Bladder Pump:    **ESP** = Electric Submersible Pump:    **PP** = Peristaltic Pump:    **O** = Other (Specify)

|   |                             |  |                       |
|---|-----------------------------|--|-----------------------|
| PUMP OR TUBING<br>DEPTH IN WELL (feet): | TUBING<br>MATERIAL CODE: PE | FIELD-FILTERED: Y <u>(N)</u><br>Filtration Equipment Type: | FILTER SIZE: _____ μm |
|---|-----------------------------|--|-----------------------|

FIELD DECONTAMINATION: PUMP Y N TUBING N N (replaced)

DUPLICATE: Y N

REMARKS: Drive point TW does not allow for DTW.

**MATERIAL CODES:** AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

**SAMPLING EQUIPMENT CODES:**    **APP** = After Peristaltic Pump;    **B** = Bailer;    **BP** = Bladder Pump;    **ESP** = Electric Submersible Pump;  
**RFPP** = Reverse Flow Peristaltic Pump;    **SM** = Straw Method (Tubing Gravity Drain);    **O** = Other (Specify)

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

**pH:**  $\pm 0.2$  units **Temperature:**  $\pm 0.2$  °C **Specific Conductance:**  $\pm 5\%$  **Dissolved Oxygen:** all readings  $\leq 20\%$  saturation (see Table FS 2200-2); optionally,  $+0.2$  mg/L or  $\pm 10\%$  (whichever is greater) **Turbidity:** all readings  $\leq 20$  NTU; optionally  $+5$  NTU or  $\pm 10\%$  (whichever is greater)

Revision Date: February 1, 2004



|            |                     |               |                     |
|------------|---------------------|---------------|---------------------|
| SITE NAME: | Site 3-             | SITE LOCATION | Cecil               |
| WELL NO:   | CEF-003-WP-Dawn-050 | SAMPLE ID:    | CEF-003-WP-Dawn-050 |
|            |                     | DATE:         | 4-7-11              |

|                            |      |                              |     |   |                                  |    |                               |    |
|----------------------------|------|------------------------------|-----|---|----------------------------------|----|-------------------------------|----|
| WELL<br>DIAMETER (inches): | 3/4" | TUBING<br>DIAMETER (inches): | 1/4 | WELL SCREEN INTERVAL<br>DEPTH: 2.5ft to 2.0ft | STATIC DEPTH<br>TO WATER (feet): | NA | PURGE PUMP TYPE<br>OR BAILER: | PD |
|----------------------------|------|------------------------------|-----|---|----------------------------------|----|-------------------------------|----|

(only fill out if applicable)

$$= (\text{feet} - \text{feet}) \times \text{gallons/foot} = \text{gallons}$$

(only fill out if applicable)

$$= \text{gallons} + (\text{gallons/foot} \times \text{feet}) + \text{gallons} = \text{gallons}$$

TOTAL VOLUME  
PURGED (gallons): 414

**TUBING INSIDE DIA. CAPACITY (Gal./Ft.):** 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

**PURGING EQUIPMENT CODES:**    **B** = Bailer:    **BP** = Bladder Pump:    **ESP** = Electric Submersible Pump:    **PP** = Peristaltic Pump:    **O** = Other (Specify)

|   |   |                             |                         |
|---|---|-----------------------------|-------------------------|
| SAMPLED BY (PRINT) / AFFILIATION:<br>David Siefken / IT | SAMPLER(S) SIGNATURE(S):<br>[Signature] | SAMPLING INITIATED AT: 1140 | SAMPLING ENDED AT: 1145 |
|---|---|-----------------------------|-------------------------|

FILTER SIZE: \_\_\_\_\_  $\mu\text{m}$

|            |  |
|------------|--|
| DUPLICATE: |  |
|------------|--|

|             |  |
|-------------|--|
| SUPERVISOR: |  |
|             |  |

REMARKS:

Purged dry. Numerous times very very poor & producing well.

**MATERIAL CODES:** AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

**SAMPLING EQUIPMENT CODES:** APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump;  
RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

**pH:**  $\pm 0.2$  units **Temperature:**  $\pm 0.2$  °C **Specific Conductance:**  $\pm 5\%$  **Dissolved Oxygen:** all readings  $\leq 20\%$  saturation (see Table FS 2200-2); optionally,  $\pm 0.2$  mg/L or  $\pm 10\%$  (whichever is greater) **Turbidity:** all readings  $\leq 20$  NTU; optionally  $\pm 5$  NTU or  $\pm 10\%$  (whichever is greater)

Revision Date: February 1, 2004

DEP-SOP-001/01  
FS 2200 Groundwater Sampling

|                                   |  |                                     |  |
|-----------------------------------|--|-------------------------------------|--|
| SITE NAME: <u>Site 3</u>          |  | SITE LOCATION: <u>Cecil</u>         |  |
| WELL NO: <u>CEF-003-WP-UP-050</u> |  | SAMPLE ID: <u>CEF-003-WP-UP-050</u> |  |
| DATE: <u>4-7-11</u>               |  |                                     |  |

**PURGING DATA**

|  |   |   |   |   |                     |            |  |  |                  |                  |                 |
|--|---|---|---|---|---------------------|------------|--|--|------------------|------------------|-----------------|
| WELL DIAMETER (inches): <u>3/4</u>   | TUBING DIAMETER (inches): <u>1/4</u>                  | WELL SCREEN INTERVAL DEPTH: <u>2.5</u> ft | STATIC DEPTH TO WATER (feet): <u>No</u> | PURGE PUMP TYPE OR BAILER: <u>PP</u>      |                     |            |  |  |                  |                  |                 |
| WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY<br>(only fill out if applicable)                 |   |   |   |   |                     |            |  |  |                  |                  |                 |
| = (      feet -      feet ) X      gallons/foot =      gallons   |   |   |   |   |                     |            |  |  |                  |                  |                 |
| EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME<br>(only fill out if applicable) |   |   |   |   |                     |            |  |  |                  |                  |                 |
| =      gallons + (      gallons/foot X      feet ) +      gallons =      gallons   |   |   |   |   |                     |            |  |  |                  |                  |                 |
| INITIAL PUMP OR TUBING DEPTH IN WELL (feet): <u>2.5</u>  | FINAL PUMP OR TUBING DEPTH IN WELL (feet): <u>2.5</u> | PURGING INITIATED AT: <u>1230</u>         | PURGING ENDED AT: <u>1300</u>           | TOTAL VOLUME PURGED (gallons): <u>~12</u> |                     |            |  |  |                  |                  |                 |
| TIME   | VOLUME PURGED (gallons)                               | CUMUL. VOLUME PURGED (gallons)            | PURGE RATE (gpm)                        | DEPTH TO WATER (feet)                     | pH (standard units) | TEMP. (°C) | COND. (circle units) μmhos/cm or μS/cm | DISSOLVED OXYGEN (circle units) mg/L or % saturation | TURBIDITY (NTUs) | COLOR (describe) | ODOR (describe) |
| 1230   | 0   | 0   | 100                                     |   |                     |            |  |  |                  |                  |                 |
| 1240   | 1000  | 1000                                      | 100                                     | NA  | 6.38                | 23.80      | 0.262                                  | 151  | 44               | lt. Brown        | -               |
| 1300   |   |   |   |   |                     |            |  |  | 41               |                  |                 |
| (1300)   |   |   |   |   |                     |            |  |  |                  |                  |                 |
| WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88     |   |   |   |   |                     |            |  |  |                  |                  |                 |
| TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016  |   |   |   |   |                     |            |  |  |                  |                  |                 |
| PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)            |   |   |   |   |                     |            |  |  |                  |                  |                 |

**SAMPLING DATA**

|   |              |               |          |   |                               |                              |  |                                    |      |                                |  |
|---|--------------|---------------|----------|---|-------------------------------|------------------------------|--|------------------------------------|------|--------------------------------|--|
| SAMPLED BY (PRINT) / AFFILIATION: <u>David Siefen / IT</u>  |              |               |          | SAMPLER(S) SIGNATURE(S): <u>[Signature]</u> |                               |                              |  | SAMPLING INITIATED AT: <u>1300</u> |      | SAMPLING ENDED AT: <u>1305</u> |  |
| PUMP OR TUBING DEPTH IN WELL (feet): <u>2.5</u>   |              |               |          | TUBING MATERIAL CODE: <u>PE</u>             |                               | FIELD-FILTERED: Y <u>(N)</u> |  | FILTER SIZE:      μm               |      |                                |  |
| FIELD DECONTAMINATION: PUMP Y <u>(N)</u>  |              |               |          | TUBING <u>(Y)</u> N (replaced)              |                               | DUPLICATE: Y <u>(N)</u>      |  |                                    |      |                                |  |
| SAMPLE CONTAINER SPECIFICATION  |              |               |          | SAMPLE PRESERVATION                         |                               |                              |  | INTENDED ANALYSIS AND/OR METHOD    |      | SAMPLING EQUIPMENT CODE        |  |
| SAMPLE ID CODE  | # CONTAINERS | MATERIAL CODE | VOLUME   | PRESERVATIVE USED                           | TOTAL VOL ADDED IN FIELD (mL) | FINAL pH                     |  |                                    |      |                                |  |
| 1   | 3            | CG            | (3)40 mL | HCL   | (3) 40 mL                     | <2                           |  | Select 8260 B                      | RFPP |                                | SAMPLE PUMP FLOW RATE (mL per minute) <u>100</u> |
| REMARKS:  |              |               |          |   |                               |                              |  |                                    |      |                                |  |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |              |               |          |   |                               |                              |  |                                    |      |                                |  |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |              |               |          |   |                               |                              |  |                                    |      |                                |  |

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

(X) TW Purged dry 2 time before I got enough H<sub>2</sub>O for 1<sup>st</sup> Flow cell reading

Form FD 9000-24  
**GROUNDWATER SAMPLING LOG**

|                                       |                              |                      |  |
|---------------------------------------|------------------------------|----------------------|--|
| SITE NAME: CEF-003-WP-UP-025 / site 3 |                              | SITE LOCATION: Cecil |  |
| WELL NO: UP-025                       | SAMPLE ID: CEF-003-WP-UP-025 | DATE 4-7-11          |  |

## PURGING DATA

|   |   |   |  |  |
|---|---|---|--|--|
| WELL<br>DIAMETER (inches): <u>3 3/4</u> | TUBING<br>DIAMETER (inches): <u>3 1/4</u> | WELL SCREEN INTERVAL<br>DEPTH: <u>21</u> feet to <u>20</u> feet | STATIC DEPTH<br>TO WATER (feet): <u>NA</u> | PURGE PUMP TYPE<br>OR BAILER: Peristaltic Pump |
|---|---|---|--|--|

**WELL VOLUME PURGE:** 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY  
(only fill out if applicable)

**EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME**  
(only fill out if applicable)


| INITIAL PUMP OR TUBING DEPTH IN WELL (feet): |  | FINAL PUMP OR TUBING DEPTH IN WELL (feet): | PURGING INITIATED AT: | PURGING ENDED AT: | TOTAL VOLUME PURGED (liters): |
|--|--|--|-----------------------|-------------------|-------------------------------|
| 2.5  |  | 2.5  | 1335                  | 1405              | 4.0                           |

[illegible]

**WELL CAPACITY** (Liters Per Foot): **0.75"** = 0.0757; **1"** = 0.151; **1.25"** = 0.227; **2"** = 0.605; **3"** = 0.37; **4"** = 1.40; **5"** = 3.861; **6"** = 5.564; **12"** = 22.25  
**TUBING INSIDE DIA. CAPACITY** (Ltr./Ft.): **1/8"** = 0.00227; **3/16"** = 0.00529; **1/4"** = 0.00984; **5/16"** = 0.0151; **3/8"** = 0.0227; **1/2"** = 0.0378; **5/8"** = 0.0605

**PURGING EQUIPMENT CODES:** B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

## SAMPLING DATA

|   |   |                             |                         |
|---|---|-----------------------------|-------------------------|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Dave Sjöfner / TINUS | SAMPLER(S) SIGNATURE(S):<br> | SAMPLING INITIATED AT: 1410 | SAMPLING ENDED AT: 1415 |
|---|---|-----------------------------|-------------------------|

|                                      |     |  |                            |                       |
|--------------------------------------|-----|--|----------------------------|-----------------------|
| PUMP OR TUBING DEPTH IN WELL (feet): | 2.5 | TUBING MATERIAL CODE: Teflon Poly (circle one) | FIELD-FILTERED: Y <u>N</u> | FILTER SIZE: _____ μm |
|--------------------------------------|-----|--|----------------------------|-----------------------|

|                        |      |   |   |        |   |              |            |   |   |
|------------------------|------|---|---|--------|---|--------------|------------|---|---|
| FIELD DECONTAMINATION: | PUMP | Y | N | TUBING | Y | N (replaced) | DUPLICATE: | Y | N |
|------------------------|------|---|---|--------|---|--------------|------------|---|---|

| SAMPLE CONTAINER SPECIFICATION | SAMPLE PRESERVATION | INTENDED | SAMPLING | SAMPLE PUMP |
|--------------------------------|---------------------|----------|----------|-------------|
|--------------------------------|---------------------|----------|----------|-------------|

| SAMPLE CONTAINER IDENTIFICATION |   |          |        | PRESERVATIVE | TOTAL VOL | FINAL | ANALYSIS AND/OR METHOD | EQUIPMENT CODE | FLOW RATE (mL per minute) |
|---------------------------------|---|----------|--------|--------------|-----------|-------|------------------------|----------------|---------------------------|
| SAMPLE                          | # | MATERIAL | VOLUME |              |           |       |                        |                |                           |

[illegible]

|   |   |    |    |     |    |    |      |     |    |
|---|---|----|----|-----|----|----|------|-----|----|
| 1 | 3 | CG | 40 | HCL | 40 | 22 | 8260 | KIT | 15 |
|---|---|----|----|-----|----|----|------|-----|----|

[illegible][illegible][illegible][illegible][illegible]

REMARKS:

**MATERIAL CODES:** AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

**SAMPLING EQUIPMENT CODES:**      **APP** = After Peristaltic Pump;      **B** = Bailer;      **BP** = Bladder Pump;      **ESP** = Electric Submersible Pump;  
    **RFPP** = Reverse Flow Peristaltic Pump;      **SM** = Straw Method (Tubing Gravity Drain);      **O** = Other (Specify)

**NOTES:** 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

**pH:**  $\pm 0.2$  units **Temperature:**  $\pm 0.2$  °C **Specific Conductance:**  $\pm 5\%$  **Dissolved Oxygen:** all readings  $\leq 20\%$  saturation (see Table FS 2200-2); optionally,  $\pm 0.2$  mg/L or  $\pm 10\%$  (whichever is greater). **Turbidity:** all readings  $\leq 20$  NTU; optionally  $\pm 5$  NTU or  $\pm 10\%$  (whichever is greater)

## Siefken, David

**From:** Simcik, Robert  
**Sent:** Tuesday, March 29, 2011 11:50 AM  
**To:** Siefken, David  
**Subject:** FW: Site 3 Pilot Test \_ additional Well Point sampling.

Dave, here is the list of "Select VOCs" for the COC.

|   |                    |
|---|--------------------|
| Select Volatile Organic Compounds (VOC) | SW-846 5030B/8260B |
|---|--------------------|

**From:** Grabka, David [mailto:David.Grabka@dep.state.fl.us]  
**Sent:** Tuesday, March 29, 2011 11:43 AM  
**To:** Simcik, Robert; Vaughn-Wright.Debbie@epamail.epa.gov; Sanford, Art F CTR OASN (EI&E), BRAC PMO SE; mark.e.davidson@navy.mil; stacin.martin@navy.mil; Jessica Keener; Jonnet, Mark; Michael.Halil@CH2M.com  
**Cc:** Boerio, Megan  
**Subject:** RE: Site 3 Pilot Test \_ additional Well Point sampling.

Thanks. The list looks fine.

---

**From:** Simcik, Robert [mailto:Robert.Simcik@tetrattech.com]  
**Sent:** Monday, March 28, 2011 3:18 PM  
**To:** Grabka, David; Vaughn-Wright.Debbie@epamail.epa.gov; Sanford, Art F CTR OASN (EI&E), BRAC PMO SE; mark.e.davidson@navy.mil; stacin.martin@navy.mil; Jessica Keener; Jonnet, Mark; Michael.Halil@CH2M.com  
**Cc:** Boerio, Megan  
**Subject:** RE: Site 3 Pilot Test \_ additional Well Point sampling.

Dave, we reviewed the GCTL exceedences for the wells that have the potential to migrate to the creek and developed the following list of Select VOCs for the Well Point sampling analysis. Note that this "additional sampling to support the pilot test design" does not match the list of select VOC (19) and select SVOCs (6) in the UFP SAP because we are only looking at the parameters which have the potential to impact the surface water. Also analyzing 1,2-Dichlorobenzene and Naphthalene as a VOC, not SVOC, as cost savings measure. Cis doesn't have a SW limit, but I want to see what, if anything is going on with it.

**SW-846 METHOD 8260-B  
ANALYTICAL DETECTION LIMITS  
Volatile Organic Compounds  
NAS Cecil Field**

| Parameter              | 62-777 Minimum<br>surface water<br>criteria |
|------------------------|---|
| <b>VOCs (UG/L)</b>     |   |
| 1,1-DICHLOROETHENE     | 3.2   |
| 1,2-DICHLOROBENZENE    | 99  |
| 1,4-DICHLOROBENZENE    | 3   |
| NAPHTHALENE            | 26  |
| TRICHLOROETHENE        | 80.7  |
| CIS-1,2-DICHLOROETHENE | NA  |
| VINYL CHLORIDE         | 2.4   |



## EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME/MODEL:

MANUFACTURER:

SERIAL NUMBER: \_\_\_\_\_

[illegible]





TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER

0878

PAGE 1 OF 1

|  |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  |                   |  |
|--|------|-----------------------------|-----|--|-------------------|-----------------------------------|---|---|---|--|--|------|--|-------------------|--|
| PROJECT NO:<br>112902267   |      | FACILITY:<br>CECIL / Site 3 |     | PROJECT MANAGER<br>Rob Simcik            |                   | PHONE NUMBER<br>412 921 8163      |   | LABORATORY NAME AND CONTACT:<br>Kathleen Lab        |   |  |  |      |  |                   |  |
| SAMPLERS (SIGNATURE)<br><i>RLH</i>   |      |                             |     | FIELD OPERATIONS LEADER<br>David Siefken |                   | PHONE NUMBER<br>904 334-7260      |   | ADDRESS<br>600 Technology Way                       |   |  |  |      |  |                   |  |
|  |      |                             |     | CARRIER/WAYBILL NUMBER                   |                   |                                   |   | CITY, STATE<br>Scarborough, ME 04074                |   |  |  |      |  |                   |  |
| STANDARD TAT <input type="checkbox"/><br>RUSH TAT <input checked="" type="checkbox"/> <i>RUSH</i><br><input checked="" type="checkbox"/> 24 hr. <input type="checkbox"/> 48 hr. <input type="checkbox"/> 72 hr. <input type="checkbox"/> 7 day <input type="checkbox"/> 14 day |      |                             |     |  |                   |                                   |   | CONTAINER TYPE<br>PLASTIC (P) or GLASS (G) <i>G</i> |   |  |  |      |  |                   |  |
|  |      |                             |     |  |                   |                                   |   | PRESERVATIVE USED                                   |   |  |  |      |  |                   |  |
|  |      |                             |     |  |                   |                                   |   | TYPE OF ANALYSIS<br><i>⊗ Select VOC 8260B</i>       |   |  |  |      |  |                   |  |
| LOCATION ID  |      |                             |     | TOP DEPTH (FT)                           | BOTTOM DEPTH (FT) | MATRIX (GW, SO, SW, SD, QC, ETC.) | COLLECTION METHOD<br>GRAB (G)<br>COMP (C) | No. OF CONTAINERS                                   |   |  |  |      |  |                   |  |
| 1  | 1    |                             | CEF | 7.68'                                    | 9.68'             | GW                                | G   | 3   | ✓ |  |  |      |  | requestion 331452 |  |
| 2  | 1640 | CEF-003-WP-Original         | CEF | 2.0'                                     | 2.5'              | GW                                | G   | 3   | ✓ |  |  |      |  |                   |  |
| 3  | 1645 | CEF-003-DUP01               | CEF | -  | -                 | GW                                | G   | 3   | ✓ |  |  |      |  | ⊗ Select VOC      |  |
|  |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  | 1,1- DCE          |  |
|  |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  | 1,2- DCE          |  |
|  |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  | 1,4- DCE          |  |
|  |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  | Naphthalene       |  |
|  |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  | Trichloroethene   |  |
|  |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  | 1,2 DCE (cis)     |  |
|  |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  | VOC               |  |
| 1. RELINQUISHED BY <i>RLC</i>  |      |                             |     | DATE<br>7-6-11                           |                   | TIME<br>1022                      |   | 1. RECEIVED BY                                      |   |  |  | DATE |  | TIME              |  |
| 2. RELINQUISHED BY   |      |                             |     | DATE                                     |                   | TIME                              |   | 2. RECEIVED BY                                      |   |  |  | DATE |  | TIME              |  |
| 3. RELINQUISHED BY   |      |                             |     | DATE                                     |                   | TIME                              |   | 3. RECEIVED BY                                      |   |  |  | DATE |  | TIME              |  |
| COMMENTS   |      |                             |     |  |                   |                                   |   |   |   |  |  |      |  |                   |  |

DISTRIBUTION:

WHITE (ACCOMPANIES SAMPLE)

YELLOW (FIELD COPY)

PINK (FILE COPY)

4/02R  
FORM NO. TINUS-001



DEP-SOP-001/01  
FS 2200 Groundwater Sampling

|                          |  |                                   |  |
|--------------------------|--|-----------------------------------|--|
| SITE NAME: <u>Site 3</u> |  | SITE LOCATION: <u>Cecil</u>       |  |
| WELL NO: <u>WP2-OLD</u>  |  | SAMPLE ID: <u>CEF-003-WP2-OLD</u> |  |
| DATE: <u>4-6-11</u>      |  |                                   |  |

**PURGING DATA**

|  |   |   |  |                                      |                     |            |  |  |                  |                  |                 |
|--|---|---|--|--------------------------------------|---------------------|------------|--|--|------------------|------------------|-----------------|
| WELL DIAMETER (inches): <u>1 1/4</u>   | TUBING DIAMETER (inches): <u>1/4</u>                  | WELL SCREEN INTERVAL DEPTH: <u>9.64</u> to <u>7.16</u> ft | STATIC DEPTH TO WATER (feet): <u>5.8</u> | PURGE PUMP TYPE OR BAILER: <u>PP</u> |                     |            |  |  |                  |                  |                 |
| WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY<br>(only fill out if applicable)<br>= (                      feet -                      feet ) X                      gallons/foot = <u>22 L</u> gallons  |   |   |  |                                      |                     |            |  |  |                  |                  |                 |
| EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME<br>(only fill out if applicable)<br>=                      gallons + (                      gallons/foot X                      feet ) +                      gallons =                      gallons |   |   |  |                                      |                     |            |  |  |                  |                  |                 |
| INITIAL PUMP OR TUBING DEPTH IN WELL (feet): <u>9.50</u>   | FINAL PUMP OR TUBING DEPTH IN WELL (feet): <u>9.5</u> | PURGING INITIATED AT: <u>1530</u>                         | PURGING ENDED AT:                        | TOTAL VOLUME PURGED (gallons):       |                     |            |  |  |                  |                  |                 |
| TIME   | VOLUME PURGED (gallons)                               | CUMUL. VOLUME PURGED (gallons)                            | PURGE RATE (gpm)                         | DEPTH TO WATER (feet)                | pH (standard units) | TEMP. (°C) | COND. (circle units) $\mu$ mhos/cm or $\mu$ S/cm | DISSOLVED OXYGEN (circle units) mg/L or % saturation | TURBIDITY (NTUs) | COLOR (describe) | ODOR (describe) |
| 1530   | 0   | 0   | 100                                      | 5.80                                 |                     |            |  |  |                  |                  |                 |
| 1600   | 3000  | 3000  | 100                                      | 8.07                                 | 6.42                | 21.00      | 0.229  | 21.6 %   | 2.01             | clear            | None            |
| 1610   | 1000  | 4000  | 100                                      | 8.08                                 | 6.39                | 20.96      | 0.227  | 11 %   | 2.00             | clear            | None            |
| 1615   | 500   | 4500  | 100                                      | 8.08                                 | 6.34                | 20.93      | 0.227  | 9.4  | 1.98             | clear            | None            |
| 1620   | 500   | 5000  | 100                                      | 8.08                                 | 6.35                | 20.76      | 0.226  | 9.3  | 1.99             | clear            | None            |
| (1620 circled)   |   |   |  |                                      |                     |            |  |  |                  |                  |                 |
| WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88   |   |   |  |                                      |                     |            |  |  |                  |                  |                 |
| TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016  |   |   |  |                                      |                     |            |  |  |                  |                  |                 |
| PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)  |   |   |  |                                      |                     |            |  |  |                  |                  |                 |

**SAMPLING DATA**

|   |              |               |          |  |                               |   |               |                                    |      |                                |     |
|---|--------------|---------------|----------|--|-------------------------------|---|---------------|------------------------------------|------|--------------------------------|-----|
| SAMPLED BY (PRINT) / AFFILIATION: <u>David Siefken / T+</u>   |              |               |          | SAMPLER(S) SIGNATURE(S): <u>[Signature]</u>                                      |                               |   |               | SAMPLING INITIATED AT: <u>1620</u> |      | SAMPLING ENDED AT: <u>1630</u> |     |
| PUMP OR TUBING DEPTH IN WELL (feet): <u>9.5</u>   |              |               |          | TUBING MATERIAL CODE: <u>PE</u>  |                               | FIELD-FILTERED: Y <input checked="" type="checkbox"/> NO <input type="checkbox"/> |               | FILTER SIZE: <u>05</u> $\mu$ m     |      |                                |     |
| FIELD DECONTAMINATION: PUMP Y <input checked="" type="checkbox"/> TUBING Y <input checked="" type="checkbox"/> N (replaced)   |              |               |          | DUPLICATE: <input checked="" type="checkbox"/> <input type="checkbox"/> Not Dup. |                               |   |               |                                    |      |                                |     |
| SAMPLE CONTAINER SPECIFICATION  |              |               |          | SAMPLE PRESERVATION  |                               |   |               | INTENDED ANALYSIS AND/OR METHOD    |      | SAMPLING EQUIPMENT CODE        |     |
| SAMPLE ID CODE  | # CONTAINERS | MATERIAL CODE | VOLUME   | PRESERVATIVE USED  | TOTAL VOL ADDED IN FIELD (mL) | FINAL pH  |               |                                    |      |                                |     |
| 1   | 3            | CG            | (3)40 mL | HCL  | (3) 40 mL                     | <2  | Select 8260 B |                                    | RFPP |                                | 100 |
| REMARKS: <u>DUP = CEF-003-DUP01</u>   |              |               |          |  |                               |   |               |                                    |      |                                |     |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |              |               |          |  |                               |   |               |                                    |      |                                |     |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |              |               |          |  |                               |   |               |                                    |      |                                |     |

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH:  $\pm 0.2$  units Temperature:  $\pm 0.2$  °C Specific Conductance:  $\pm 5\%$  Dissolved Oxygen: all readings  $\leq 20\%$  saturation (see Table FS 2200-2); optionally,  $\pm 0.2$  mg/L or  $\pm 10\%$  (whichever is greater) Turbidity: all readings  $\leq 20$  NTU; optionally  $\pm 5$  NTU or  $\pm 10\%$  (whichever is greater)

Revision Date: February 12, 2009

# Legend

|                    |       |
|--------------------|-------|
| 25' Upgradient     | VC    |
| SWCTL              | [2.4] |
| Edge 2.0'-2.5'     | 69/32 |
| In Creek 0.0'-0.5' | 8.7   |

Location based on WP  
Edge - sampled at creek water edge  
In Creek - sampled 2' to 3' into creek water from Bank

SWCTL - surface water criteria

Vinyl Chloride result (ug/L)

Yellow - sampled April 6 -7, 2011

No shading - sampled April 19, 2011

Sample depth - screen top below surface water or ground surface for Edge samples



Two old PVC WP

Two old PVC WP

Old WP in creek

Extent of Groundwater Contamination  
(From RI)

CEF-003-31S [20-30]

CEF-003-32D [56-66]

WP  
WP#2  
WP#1

|                |           |
|----------------|-----------|
| Well Point     | VC        |
| SWCTL          | [2.4]     |
| WP#2 2.0'-2.5' | 32        |
| WP 2.0'-2.5'   | 1.3 I/2.7 |

|                |       |
|----------------|-------|
| 50' Upgradient | VC    |
| SWCTL          | [2.4] |
| Edge 2.0'-2.5' | 56    |

|                    |       |
|--------------------|-------|
| 25' Upgradient     | VC    |
| SWCTL              | [2.4] |
| Edge 2.0'-2.5'     | 69/32 |
| In Creek 0.0'-0.5' | 8.7   |
| 0.5'-1.0'          | 12    |
| 1.0'-1.5'          | 61    |
| 2.0'-2.5'          | 12    |

|                |        |
|----------------|--------|
| WP (Solutions) | VC     |
| All 2.0'-4.0'  |        |
| SWCTL          | [2.4]  |
| 07/06          | 5.9*   |
| 01/07          | 0.5 U  |
| 07/07          | 0.34 U |
| 10/08          | 0.3 U  |
| 09/09          | 12.9*  |
| 09/10          | 5.0*   |

CEF-003-35D [55-65]

CEF-003-34S [25-35]

|                    |        |
|--------------------|--------|
| 25' Downgradient   | VC     |
| SWCTL              | [2.4]  |
| Edge 2.0'-2.5'     | 68     |
| In Creek 0.0'-0.5' | 0.25 U |
| 0.5'-1.0'          | 59     |
| 1.0'-1.5'          | 4.2    |
| 2.0'-2.5'          | 57     |

|                     |       |
|---------------------|-------|
| 50' Downgradient VC |       |
| SWCTL               | [2.4] |
| Edge 2.0'-2.5'      | 5.5   |

20 0 20 Feet

|   |  |                             |  |   |      |   |   |  |   |   |  |      |  |      |  |
|---|--|-----------------------------|--|---|------|---|---|--|---|---|--|------|--|------|--|
| PROJECT NO:<br>112908267  |  | FACILITY:<br>Cecil / Site 3 |  | PROJECT MANAGER<br>Rob Simcik                   |      | PHONE NUMBER<br><del>604</del> 412-921-8163 |   | LABORATORY NAME AND CONTACT:<br>Katahdin   |   |   |  |      |  |      |  |
| SAMPLERS (SIGNATURE)<br>  |  |                             |  | FIELD OPERATIONS LEADER<br>Dave Stiephen        |      | PHONE NUMBER<br>904-334-7260                |   | ADDRESS<br>600 Technology Way              |   |   |  |      |  |      |  |
|   |  |                             |  | CARRIER/WAYBILL NUMBER<br>FEDEX! 8427-1834-4783 |      |   |   | CITY, STATE<br>Scarborough, ME 04074       |   |   |  |      |  |      |  |
| STANDARD TAT <input type="checkbox"/><br>RUSH TAT <input type="checkbox"/><br><input type="checkbox"/> 24 hr. <input type="checkbox"/> 48 hr. <input checked="" type="checkbox"/> 72 hr. <input type="checkbox"/> 7 day <input type="checkbox"/> 14 day |  |                             |  |   |      |   |   | CONTAINER TYPE<br>PLASTIC (P) or GLASS (G) |   |   |  |      |  |      |  |
|   |  |                             |  |   |      |   |   | PRESERVATIVE USED                          |   |   |  |      |  |      |  |
|   |  |                             |  |   |      |   |   | TYPE OF ANALYSIS                           |   |   |  |      |  |      |  |
|   |  |                             |  |   |      |   |   | 8260B @ Select                             |   |   |  |      |  |      |  |
|   |  |                             |  |   |      |   |   |  |   | COMMENTS  |  |      |  |      |  |
| 4/19 1145 CEF-003-WP-UP25-2025 2'-2.5'  |  |                             |  | 2.0'  | 2.5' | GW  | G | 3  | ✓ | Select VOC<br>1,1 DCE<br>1,2 DCB<br>1,4 DCB<br>Naphthalene<br>Trichloroethene<br>Cis-1,2 Dichloroethene<br>VC |  |      |  |      |  |
| 4/19 1205 CEF-003-WP-UP25-1015 1'-1.5'  |  |                             |  | 1.0'  | 1.5' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1215 CEF-003-WP-UP25-0510 .5'-1'   |  |                             |  | 0.5'  | 1.0' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1220 CEF-003-WP-DNP01 -  |  |                             |  | -   | -    | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1230 CEF-003-WP-UP25-0005 0'-0.5'  |  |                             |  | 0.0'  | 0.5' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1415 CEF-003-WP-UP25-RS 2'-2.5'  |  |                             |  | 2.0'  | 2.5' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1510 CEF-003-WP-DN25-0510 .5'-1'   |  |                             |  | 0.5'  | 1.0' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1445 CEF-003-WP-DN25-2025 2'-2.5'  |  |                             |  | 2.0'  | 2.5' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1455 CEF-003-WP-DN25-1015 1'-1.5'  |  |                             |  | 1.0'  | 1.5' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1535 CEF-003-WP-DN25-0005 0'-0.5'  |  |                             |  | 0.0'  | 0.5' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
| 4/19 1630 CEF-003-WP-ORG-RS 2'-2.5'   |  |                             |  | 2.0'  | 2.5' | GW  | G | 3  | ✓ |   |  |      |  |      |  |
|   |  |                             |  |   |      |   |   |  |   |   |  |      |  |      |  |
|   |  |                             |  |   |      |   |   |  |   |   |  |      |  |      |  |
| 1. RELINQUISHED BY  |  |                             |  | DATE 4/19/11                                    |      | TIME 1600                                   |   | 1. RECEIVED BY                             |   |   |  | DATE |  | TIME |  |
| 2. RELINQUISHED BY  |  |                             |  | DATE  |      | TIME  |   | 2. RECEIVED BY                             |   |   |  | DATE |  | TIME |  |
| 3. RELINQUISHED BY  |  |                             |  | DATE  |      | TIME  |   | 3. RECEIVED BY                             |   |   |  | DATE |  | TIME |  |
| COMMENTS  |  |                             |  |   |      |   |   |  |   |   |  |      |  |      |  |



## GROUNDWATER SAMPLING LOG

|                              |                                 |                          |  |
|------------------------------|---------------------------------|--------------------------|--|
| SITE<br>NAME: Cecil / Site 3 |                                 | SITE<br>LOCATION: Site 3 |  |
| WELL NO: WP-UP25-2025        | SAMPLE ID: CEF-003-WP-UP25-2025 | DATE 4/19 4/19/2011      |  |

## PURGING DATA

|  |  |   |  |  |                           |               |   |  |                     |                     |                           |
|--|--|---|--|--|---------------------------|---------------|---|--|---------------------|---------------------|---------------------------|
| WELL<br>DIAMETER (inches): 1   | TUBING<br>DIAMETER (inches): 3/16                  | WELL SCREEN INTERVAL<br>DEPTH: 2.0 feet to 2.5 feet | STATIC DEPTH<br>TO WATER (feet): 72.5 NA | PURGE PUMP TYPE<br>OR BAILER: Peristaltic Pump |                           |               |   |  |                     |                     |                           |
| WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY<br>(only fill out if applicable)<br>= (                      feet -                      feet ) X                      liters/foot =                      liters   |  |   |  |  |                           |               |   |  |                     |                     |                           |
| EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME<br>(only fill out if applicable)<br>=                      liters + (                      liters/foot X                      feet ) +                      liters =                      liters |  |   |  |  |                           |               |   |  |                     |                     |                           |
| INITIAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25   | FINAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25 | PURGING<br>INITIATED AT: 1100                       | PURGING<br>ENDED AT: 1135                | TOTAL VOLUME<br>PURGED (liters): 15            |                           |               |   |  |                     |                     |                           |
| TIME   | VOLUME<br>PURGED<br>(gallons) L                    | CUMUL.<br>VOLUME<br>PURGED<br>(gallons) L           | PURGE<br>RATE<br>gpm                     | DEPTH<br>TO<br>WATER<br>(feet)                 | pH<br>(standard<br>units) | TEMP.<br>(°C) | COND.<br>(circle units)<br>µmhos/cm<br>or µS/cm | DISSOLVED<br>OXYGEN<br>(circle units)<br>mg/L or<br>% saturation | TURBIDITY<br>(NTUs) | COLOR<br>(describe) | ORP<br>ODOR<br>(describe) |
| 1100   | 0  | 0   | 300                                      | NA   |                           |               |   |  |                     |                     |                           |
| 1120   | 6.00   | 6.0   | 300                                      | NA   | 6.46                      | 23.23         | 0.228   | 10.7   | 22.97               | Clear               | -                         |
| 1125   | 3  | 9   | 300                                      | NA   | 6.47                      | 23.21         | 0.232   | 10.3   | 20.12               | Clear               | -                         |
| 1130   | 3  | 12  | 300                                      | NA   | 6.47                      | 23.01         | 0.233   | 11.6   | 11.45               | Clear               | (-) 147                   |
| 1132   | 1.5  | 13.5  | 300                                      | NA   | 6.47                      | 23.16         | 0.235   | 11.8   | 11.62               | Clear               | (-) 149                   |
| 1135   | 1.5  | 15  | 300                                      | NA   |                           |               |   |  |                     |                     |                           |
| 1145 SAMPLE  |  |   |  |  |                           |               |   |  |                     |                     |                           |
| WELL CAPACITY (Liters Per Foot): 0.75" = 0.0757; 1" = 0.151; 1.25" = 0.227; 2" = 0.605; 3" = 0.37; 4" = 1.40; 5" = 3.861; 6" = 5.564; 12" = 22.25<br>TUBING INSIDE DIA. CAPACITY (Ltr./Ft.): 1/8" = 0.00227; 3/16" = 0.00529; 1/4" = 0.00984; 5/16" = 0.0151; 3/8" = 0.0227; 1/2" = 0.0378; 5/8" = 0.0605      |  |   |  |  |                           |               |   |  |                     |                     |                           |
| PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)  |  |   |  |  |                           |               |   |  |                     |                     |                           |

## SAMPLING DATA

|  |                 |                  |        |   |                                  |                       |                            |                                       |      |                               |  |
|--|-----------------|------------------|--------|---|----------------------------------|-----------------------|----------------------------|---------------------------------------|------|-------------------------------|--|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Jeff Krone/TINUS Dave Siefher/Tp  |                 |                  |        | SAMPLER(S) SIGNATURE(S):<br>RL                    |                                  |                       |                            | SAMPLING<br>INITIATED AT: 1145        |      | SAMPLING<br>ENDED AT: 1150    |  |
| PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25   |                 |                  |        | TUBING<br>MATERIAL CODE: Teflon Poly (circle one) |                                  | FIELD-FILTERED: Y (N) |                            | FILTER SIZE: _____ µm                 |      |                               |  |
| FIELD DECONTAMINATION: PUMP Y (N)  |                 |                  |        | TUBING (Y) N (replaced)                           |                                  |                       |                            | DUPLICATE: Y (N)                      |      |                               |  |
| SAMPLE CONTAINER SPECIFICATION   |                 |                  |        | SAMPLE PRESERVATION                               |                                  |                       |                            | INTENDED<br>ANALYSIS AND/OR<br>METHOD |      | SAMPLING<br>EQUIPMENT<br>CODE |  |
| SAMPLE<br>ID CODE  | #<br>CONTAINERS | MATERIAL<br>CODE | VOLUME | PRESERVATIVE<br>USED                              | TOTAL VOL<br>ADDED IN FIELD (mL) | FINAL<br>pH           |                            |                                       |      |                               |  |
| PP   | 3               | CG               | 40 ML  | HCL   | NONE                             | <2                    | VOCs (GTEX+<br>MTBE) 8260B |                                       | RFPP |                               |  |
|  |                 |                  |        |   |                                  |                       | Select ↑                   |                                       |      |                               |  |
|  |                 |                  |        |   |                                  |                       |                            |                                       |      |                               |  |
|  |                 |                  |        |   |                                  |                       |                            |                                       |      |                               |  |
|  |                 |                  |        |   |                                  |                       |                            |                                       |      |                               |  |
|  |                 |                  |        |   |                                  |                       |                            |                                       |      |                               |  |
| REMARKS:<br>Screen 20-2.5 Ft below Creek Sediment  |                 |                  |        |   |                                  |                       |                            |                                       |      |                               |  |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)   |                 |                  |        |   |                                  |                       |                            |                                       |      |                               |  |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump;<br>RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |                 |                  |        |   |                                  |                       |                            |                                       |      |                               |  |

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009 Form FD 9000-24  
**GROUNDWATER SAMPLING LOG**

|                              |                                 |                          |  |
|------------------------------|---------------------------------|--------------------------|--|
| SITE<br>NAME: Cecil / Site 3 |                                 | SITE<br>LOCATION: Site 3 |  |
| WELL NO: WP-UP25-1015        | SAMPLE ID: CEF-003-WP-UP25-1015 | DATE : 4/19/2011         |  |

**PURGING DATA**

|  |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
|--|--|---|-------------------------------------|--|---------------------------|---------------|---|--|---------------------|---------------------|---------------------------|
| WELL<br>DIAMETER (inches): 1   | TUBING<br>DIAMETER (inches): 3/16                  | WELL SCREEN INTERVAL<br>DEPTH: 1.0 feet to 1.5 feet | STATIC DEPTH<br>TO WATER (feet): NA | PURGE PUMP TYPE<br>OR BAILER: Peristaltic Pump |                           |               |   |  |                     |                     |                           |
| WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY<br>(only fill out if applicable)<br>= (      feet -      feet ) X      liters/foot =      liters                               |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME<br>(only fill out if applicable)<br>=      liters + (      liters/foot X      feet ) +      liters = 1.1 Liter |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| INITIAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 1.25   | FINAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 1.25 | PURGING<br>INITIATED AT: 1115                       | PURGING<br>ENDED AT: 1155           | TOTAL VOLUME<br>PURGED (liters): 15            |                           |               |   |  |                     |                     |                           |
| TIME   | VOLUME<br>PURGED<br>(gallons)                      | CUMUL.<br>VOLUME<br>PURGED<br>(gallons)             | PURGE<br>RATE<br>(gpm)              | DEPTH<br>TO<br>WATER<br>(feet)                 | pH<br>(standard<br>units) | TEMP.<br>(°C) | COND.<br>(circle units)<br>µmhos/cm<br>or µS/cm | DISSOLVED<br>OXYGEN<br>(circle units)<br>mg/L or<br>% saturation | TURBIDITY<br>(NTUs) | COLOR<br>(describe) | ORP<br>ODOR<br>(describe) |
| 1115   | 0  | 0   | 300                                 | NA   |                           |               |   |  |                     |                     |                           |
| 1145   | 9  | 9   | 300                                 | NA   | 6.85                      | 22.76         | 0.349   | 9.7  | 8.73                | —                   | (-)176                    |
| 1150   | 3  | 12  | 300                                 | NA   | 6.84                      | 22.76         | 0.349   | 8.4  | 8.61                | —                   | (-)188                    |
| 1155   | 3  | 15  | 300                                 | NA   | 6.83                      | 22.78         | 0.349   | 3.8  | 7.58                | —                   | (-)193                    |
| 1205 SAMPLE  |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| WELL CAPACITY (Liters Per Foot): 0.75" = 0.0757; 1" = 0.151; 1.25" = 0.227; 2" = 0.605; 3" = 0.37; 4" = 1.40; 5" = 3.861; 6" = 5.564; 12" = 22.25  |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| TUBING INSIDE DIA. CAPACITY (Ltr/Ft.): 1/8" = 0.00227; 3/16" = 0.00529; 1/4" = 0.00984; 5/16" = 0.0151; 3/8" = 0.0227; 1/2" = 0.0378; 5/8" = 0.0605  |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)  |  |   |                                     |  |                           |               |   |  |                     |                     |                           |

**SAMPLING DATA**

|   |                 |                  |        |   |                                  |             |  |                                       |      |                               |     |
|---|-----------------|------------------|--------|---|----------------------------------|-------------|--|---------------------------------------|------|-------------------------------|-----|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Dave Siefken / T+  |                 |                  |        | SAMPLER(S) SIGNATURE(S):<br><i>[Signature]</i>    |                                  |             |  | SAMPLING<br>INITIATED AT: 1205        |      | SAMPLING<br>ENDED AT: 1210    |     |
| PUMP OR TUBING<br>DEPTH IN WELL (feet): 1.25  |                 |                  |        | TUBING<br>MATERIAL CODE: Teflon Poly (circle one) |                                  |             |  | FIELD-FILTERED: Y (N)                 |      | FILTER SIZE: _____ µm         |     |
| FIELD DECONTAMINATION: PUMP (Y) N TUBING (Y) N (replaced)   |                 |                  |        | DUPLICATE: Y (N)                                  |                                  |             |  |                                       |      |                               |     |
| SAMPLE CONTAINER SPECIFICATION  |                 |                  |        | SAMPLE PRESERVATION                               |                                  |             |  | INTENDED<br>ANALYSIS AND/OR<br>METHOD |      | SAMPLING<br>EQUIPMENT<br>CODE |     |
| SAMPLE<br>ID CODE   | #<br>CONTAINERS | MATERIAL<br>CODE | VOLUME | PRESERVATIVE<br>USED                              | TOTAL VOL<br>ADDED IN FIELD (mL) | FINAL<br>pH |  |                                       |      |                               |     |
| PP  | 3               | CG               | 40 ML  | HCL   | NONE                             | <2          | VOCs (BTEX + MTBE) 82609<br>Select VOC |                                       | RFPP |                               | 200 |
| REMARKS:<br>GW sample collected 1.0 - 1.5 ft below sediment   |                 |                  |        |   |                                  |             |  |                                       |      |                               |     |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |                 |                  |        |   |                                  |             |  |                                       |      |                               |     |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |                 |                  |        |   |                                  |             |  |                                       |      |                               |     |

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009 Form FD 9000-24  
**GROUNDWATER SAMPLING LOG**

|                              |                                   |                          |  |
|------------------------------|-----------------------------------|--------------------------|--|
| SITE<br>NAME: Cecil / Site 3 |                                   | SITE<br>LOCATION: Site 3 |  |
| WELL NO: WP UP 25 OS 10      | SAMPLE ID: CEF-003-WP-UP 25 OS 10 | DATE : 4/19/2011         |  |

**PURGING DATA**

|  |   |   |                                     |  |                           |               |   |  |                     |                     |                          |
|--|---|---|-------------------------------------|--|---------------------------|---------------|---|--|---------------------|---------------------|--------------------------|
| WELL<br>DIAMETER (inches): 1   | TUBING<br>DIAMETER (inches): 3/16                 | WELL SCREEN INTERVAL<br>DEPTH: 0.5 feet to 1.0 feet | STATIC DEPTH<br>TO WATER (feet): NA | PURGE PUMP TYPE<br>OR BAILER: Peristaltic Pump |                           |               |   |  |                     |                     |                          |
| WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY<br>(only fill out if applicable)<br>= (                      feet -                      feet ) X                      liters/foot =                      liters   |   |   |                                     |  |                           |               |   |  |                     |                     |                          |
| EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME<br>(only fill out if applicable)<br>=                      liters + (                      liters/foot X                      feet ) +                      liters =                      liters |   |   |                                     |  |                           |               |   |  |                     |                     |                          |
| INITIAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.7  | FINAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.7 | PURGING<br>INITIATED AT: 1130                       | PURGING<br>ENDED AT: 1210           | TOTAL VOLUME<br>PURGED (liters): 15            |                           |               |   |  |                     |                     |                          |
| TIME   | VOLUME<br>PURGED<br>(gallons)                     | CUMUL.<br>VOLUME<br>PURGED<br>(gallons)             | PURGE<br>RATE<br>(gpm)              | DEPTH<br>TO<br>WATER<br>(feet)                 | pH<br>(standard<br>units) | TEMP.<br>(°C) | COND.<br>(circle units)<br>µmhos/cm<br>or MS/cm | DISSOLVED<br>OXYGEN<br>(circle units)<br>mg/L or<br>% saturation | TURBIDITY<br>(NTUs) | COLOR<br>(describe) | DRP<br>BOR<br>(describe) |
| 1130   | 0   | 0   | 300                                 | NA   |                           |               |   |  |                     |                     |                          |
| 1200   | 9   | 9   | 300                                 | NA   | 6.82                      | 24.13         | 0.275   | 15.4   | 6.87                | Clear               | 170                      |
| 1205   | 3   | 12  | 300                                 | NA   | 6.84                      | 24.10         | 0.274   | 12.3   | 6.55                | Clear               | 170                      |
| 1210   | 3   | 15  | 300                                 | NA   | 6.81                      | 23.82         | 0.272   | 11.3   | 6.41                | Clear               | 178                      |
| 1215 SAMPLE  |   |   |                                     |  |                           |               |   |  |                     |                     |                          |
| WELL CAPACITY (Liters Per Foot): 0.75" = 0.0757; 1" = 0.151; 1.25" = 0.227; 2" = 0.605; 3" = 0.37; 4" = 1.40; 5" = 3.861; 6" = 5.564; 12" = 22.25<br>TUBING INSIDE DIA. CAPACITY (Ltr./Ft.): 1/8" = 0.00227; 3/16" = 0.00529; 1/4" = 0.00984; 5/16" = 0.0151; 3/8" = 0.0227; 1/2" = 0.0378; 5/8" = 0.0605      |   |   |                                     |  |                           |               |   |  |                     |                     |                          |
| PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)  |   |   |                                     |  |                           |               |   |  |                     |                     |                          |

**SAMPLING DATA**

|   |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |
|---|-----------------|------------------|--------|--|----------------------------------|-------------|------------------------------------|---------------------------------------|------|-------------------------------|--|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Jeff Krone/TINUS David Siefken   |                 |                  |        | SAMPLER(S) SIGNATURE(S):<br>[Signature]              |                                  |             |                                    | SAMPLING<br>INITIATED AT: 1215        |      | SAMPLING<br>ENDED AT: 1220    |  |
| PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.7 ft  |                 |                  |        | TUBING<br>MATERIAL CODE: Teflon Poly (circle one) PE |                                  |             |                                    | FIELD-FILTERED: Y (N)                 |      | FILTER SIZE:      µm          |  |
| FIELD DECONTAMINATION: PUMP Y (N)   |                 |                  |        | TUBING (Y) N (replaced)                              |                                  |             |                                    | DUPLICATE: (Y) N                      |      | Dup 01                        |  |
| SAMPLE CONTAINER SPECIFICATION  |                 |                  |        | SAMPLE PRESERVATION                                  |                                  |             |                                    | INTENDED<br>ANALYSIS AND/OR<br>METHOD |      | SAMPLING<br>EQUIPMENT<br>CODE |  |
| SAMPLE<br>ID CODE   | #<br>CONTAINERS | MATERIAL<br>CODE | VOLUME | PRESERVATIVE<br>USED                                 | TOTAL VOL<br>ADDED IN FIELD (mL) | FINAL<br>pH |                                    |                                       |      |                               |  |
| PP  | 3               | CG               | 40 ML  | HCL  | NONE                             | <2          | VOCs (BTEX + MTBE) 8200B<br>Select |                                       | RFPP |                               |  |
|   |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |
|   |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |
|   |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |
|   |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |
|   |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |
| REMARKS:<br>GW from 0.5 - 1.0 ft below sediment   |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |                 |                  |        |  |                                  |             |                                    |                                       |      |                               |  |

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Dup = CEF-003-WP-DUP01

## GROUNDWATER SAMPLING LOG

|                              |                                  |                          |  |
|------------------------------|----------------------------------|--------------------------|--|
| SITE<br>NAME: Cecil / Site 3 |                                  | SITE<br>LOCATION: Site 3 |  |
| WELL NO: WP-UP 25 - 0005     | SAMPLE ID: CEF-003-WP-UP 25 0005 | DATE : 4/19/2011         |  |

## PURGING DATA

|   |  |   |                                     |  |                           |               |   |  |                     |                     |                   |
|---|--|---|-------------------------------------|--|---------------------------|---------------|---|--|---------------------|---------------------|-------------------|
| WELL<br>DIAMETER (inches): 1  | TUBING<br>DIAMETER (inches): 3/16                  | WELL SCREEN INTERVAL<br>DEPTH: 0.0 feet to 0.5 feet | STATIC DEPTH<br>TO WATER (feet): NA | PURGE PUMP TYPE<br>OR BAILER: Peristaltic Pump |                           |               |   |  |                     |                     |                   |
| WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY<br>(only fill out if applicable)<br>= (                      feet -                      feet ) X                      liters/foot =                      liters  |  |   |                                     |  |                           |               |   |  |                     |                     |                   |
| EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME<br>(only fill out if applicable)<br>=                      liters + (                      liters/foot X                      feet ) +                      liters =                      41 liters |  |   |                                     |  |                           |               |   |  |                     |                     |                   |
| INITIAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.25  | FINAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.25 | PURGING<br>INITIATED AT: 1140                       | PURGING<br>ENDED AT: 1225           | TOTAL VOLUME<br>PURGED (liters): 13.5          |                           |               |   |  |                     |                     |                   |
| TIME  | VOLUME<br>PURGED<br>(gallons)                      | CUMUL.<br>VOLUME<br>PURGED<br>(gallons)             | PURGE<br>RATE<br>(gpm)              | DEPTH<br>TO<br>WATER<br>(feet)                 | pH<br>(standard<br>units) | TEMP.<br>(°C) | COND.<br>(circle units)<br>µmhos/cm<br>or µS/cm | DISSOLVED<br>OXYGEN<br>(circle units)<br>mg/L or<br>% saturation | TURBIDITY<br>(NTUs) | COLOR<br>(describe) | ORP<br>(describe) |
| 1140  | 0  | 0   | 300                                 | NA   |                           |               |   |  |                     |                     |                   |
| 1215  | 10.5   | 10.5  | 300                                 | NA   | 6.52                      | 23.78         | 0.158   | 48.5   | 23.44               | -                   | (-) 88            |
| 1220  | 1.5  | 12  | 300                                 | NA   | 6.54                      | 23.68         | 0.155   | 41.2   | 16.30               | -                   | (-) 84            |
| 1225  | 1.5  | 13.5  | 300                                 | NA   | 6.53                      | 23.84         | 0.155   | 50.5   | 18.59               | -                   | (-) 84            |
| 1230  | SAMPLE   |   |                                     |  |                           |               |   |  |                     |                     |                   |
| WELL CAPACITY (Liters Per Foot): 0.75" = 0.0757; 1" = 0.151; 1.25" = 0.227; 2" = 0.605; 3" = 0.37; 4" = 1.40; 5" = 3.861; 6" = 5.564; 12" = 22.25<br>TUBING INSIDE DIA. CAPACITY (Ltr./Ft.): 1/8" = 0.00227; 3/16" = 0.00529; 1/4" = 0.00984; 5/16" = 0.0151; 3/8" = 0.0227; 1/2" = 0.0378; 5/8" = 0.0605         |  |   |                                     |  |                           |               |   |  |                     |                     |                   |
| PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)   |  |   |                                     |  |                           |               |   |  |                     |                     |                   |

## SAMPLING DATA

|  |                 |                  |        |  |                                  |             |   |                                       |      |                               |  |
|--|-----------------|------------------|--------|--|----------------------------------|-------------|---|---------------------------------------|------|-------------------------------|--|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Jeff Krone/TINUS DAVID SIEFKEN  |                 |                  |        | SAMPLER(S) SIGNATURE(S):<br>ne ll            |                                  |             |   | SAMPLING<br>INITIATED AT: 1230        |      | SAMPLING<br>ENDED AT: 1235    |  |
| PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.25   |                 |                  |        | TUBING<br>MATERIAL CODE: Teflon (circle one) |                                  |             |   | FIELD-FILTERED: Y (N)                 |      | FILTER SIZE: _____ µm         |  |
| FIELD DECONTAMINATION: PUMP Y (N)  |                 |                  |        | TUBING (Y) N (replaced)                      |                                  |             |   | DUPLICATE: Y (N)                      |      |                               |  |
| SAMPLE CONTAINER SPECIFICATION   |                 |                  |        | SAMPLE PRESERVATION                          |                                  |             |   | INTENDED<br>ANALYSIS AND/OR<br>METHOD |      | SAMPLING<br>EQUIPMENT<br>CODE |  |
| SAMPLE<br>ID CODE  | #<br>CONTAINERS | MATERIAL<br>CODE | VOLUME | PRESERVATIVE<br>USED                         | TOTAL VOL<br>ADDED IN FIELD (mL) | FINAL<br>pH |   |                                       |      |                               |  |
| PP   | 3               | CG               | 40 ML  | HCL  | NONE                             | <2          | VOCs (BTEX +<br>MDEB) 8260B<br>Select ↑ |                                       | RFPP |                               |  |
| REMARKS:<br>GW sample collected 0.0 - 0.5 ft below sediment  |                 |                  |        |  |                                  |             |   |                                       |      |                               |  |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)   |                 |                  |        |  |                                  |             |   |                                       |      |                               |  |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump;<br>RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |                 |                  |        |  |                                  |             |   |                                       |      |                               |  |

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

# GROUNDWATER SAMPLING LOG

## PURGING DATA

## SAMPLING DATA

**NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.**

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

**pH:**  $\pm 0.2$  units **Temperature:**  $\pm 0.2$  °C **Specific Conductance:**  $\pm 5\%$  **Dissolved Oxygen:** all readings  $\leq 20\%$  saturation (see Table FS 2200-2); optionally,  $\pm 0.2$  mg/L or  $\pm 10\%$  (whichever is greater) **Turbidity:** all readings  $< 20$  NTU; optionally  $+ 5$  NTU or  $\pm 10\%$  (whichever is greater)

bank  
Should



Revision Date: February 12, 2009 Form FD 9000-24  
**GROUNDWATER SAMPLING LOG**

|                              |                                    |                          |  |
|------------------------------|------------------------------------|--------------------------|--|
| SITE<br>NAME: Cecil / Site 3 |                                    | SITE<br>LOCATION: Site 3 |  |
| WELL NO: WP-DN 25- 2025      | SAMPLE ID: CEF-003-WP- DN 25- 2025 | DATE : 4/ 19 /2011       |  |

**PURGING DATA**

|   |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
|---|--|---|-------------------------------------|--|---------------------------|---------------|---|--|---------------------|---------------------|---------------------------|
| WELL<br>DIAMETER (inches): 1  | TUBING<br>DIAMETER (inches): 3/16                  | WELL SCREEN INTERVAL<br>DEPTH: 2.0 feet to 2.5 feet | STATIC DEPTH<br>TO WATER (feet): NA | PURGE PUMP TYPE<br>OR BAILER: Peristaltic Pump |                           |               |   |  |                     |                     |                           |
| <b>WELL VOLUME PURGE:</b> 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY<br>(only fill out if applicable)<br>= (                      feet -                      feet) X                      liters/foot =                      liters  |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| <b>EQUIPMENT VOLUME PURGE:</b> 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME<br>(only fill out if applicable)<br>=                      liters + (                      liters/foot X                      feet) +                      liters = <b>21</b> liters               |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| INITIAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25  | FINAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25 | PURGING<br>INITIATED AT: 1400                       | PURGING<br>ENDED AT: 1440           | TOTAL VOLUME<br>PURGED (liters): 15            |                           |               |   |  |                     |                     |                           |
| TIME  | VOLUME<br>PURGED<br>(gallons) L                    | CUMUL.<br>VOLUME<br>PURGED<br>(gallons) L           | PURGE<br>RATE<br>(gpm) $\mu$ l      | DEPTH<br>TO<br>WATER<br>(feet)                 | pH<br>(standard<br>units) | TEMP.<br>(°C) | COND.<br>(circle units)<br>$\mu$ mhos/cm<br>or $\mu$ S/cm | DISSOLVED<br>OXYGEN<br>(circle units)<br>mg/L or<br>% saturation | TURBIDITY<br>(NTUs) | COLOR<br>(describe) | DRP<br>ODOR<br>(describe) |
| 1400  | 0  | 0   | 300                                 | NA   |                           |               |   |  |                     |                     |                           |
| 1430  | 9  | 9   | 300                                 | NA   | 6.96                      | 22.85         | 0.307   | 4.3  | 11.91               | CL                  | 138                       |
| 1435  | 3  | 12  | 300                                 | NA   | 6.91                      | 22.73         | 0.304   | 2.6  | 9.88                | CL                  | 155                       |
| 1440  | 3  | 15  | 300                                 | NA   | 6.92                      | 22.71         | 0.303   | 2.4  | 8.79                | CL                  | 160                       |
| (1440 SAMPLE)   |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| <b>WELL CAPACITY</b> (Liters Per Foot): 0.75" = 0.0757; 1" = 0.151; 1.25" = 0.227; 2" = 0.605; 3" = 0.37; 4" = 1.40; 5" = 3.861; 6" = 5.564; 12" = 22.25<br><b>TUBING INSIDE DIA. CAPACITY</b> (Ltr./Ft.): 1/8" = 0.00227; 3/16" = 0.00529; 1/4" = 0.00984; 5/16" = 0.0151; 3/8" = 0.0227; 1/2" = 0.0378; 5/8" = 0.0605 |  |   |                                     |  |                           |               |   |  |                     |                     |                           |
| <b>PURGING EQUIPMENT CODES:</b> B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)  |  |   |                                     |  |                           |               |   |  |                     |                     |                           |

**SAMPLING DATA**

|  |                 |                  |        |   |                                  |             |  |  |                               |     |
|--|-----------------|------------------|--------|---|----------------------------------|-------------|--|--|-------------------------------|-----|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Jeff Krome/TINUS DAVID SIKELER  |                 |                  |        | SAMPLER(S) SIGNATURE(S):<br><i>DL</i>             |                                  |             | SAMPLING<br>INITIATED AT: 1440   |  | SAMPLING<br>ENDED AT: 1445    |     |
| PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25   |                 |                  |        | TUBING<br>MATERIAL CODE: Teflon Poly (circle one) |                                  |             | FIELD-FILTERED: Y <input checked="" type="checkbox"/> N <input type="checkbox"/> |  | FILTER SIZE: _____ $\mu$ m    |     |
| FIELD DECONTAMINATION: PUMP Y <input checked="" type="checkbox"/> N <input type="checkbox"/> TUBING Y <input checked="" type="checkbox"/> N (replaced) <input type="checkbox"/>  |                 |                  |        |   |                                  |             | DUPLICATE: Y <input checked="" type="checkbox"/> N <input type="checkbox"/>      |  |                               |     |
| SAMPLE CONTAINER SPECIFICATION   |                 |                  |        | SAMPLE PRESERVATION                               |                                  |             | INTENDED<br>ANALYSIS AND/OR<br>METHOD  |  | SAMPLING<br>EQUIPMENT<br>CODE |     |
| SAMPLE<br>ID CODE  | #<br>CONTAINERS | MATERIAL<br>CODE | VOLUME | PRESERVATIVE<br>USED                              | TOTAL VOL<br>ADDED IN FIELD (mL) | FINAL<br>pH |  |  |                               |     |
| PP   | 3               | CG               | 40 ML  | HCL   | NONE                             | <2          | VOCs (BTEX<br>MTBE) 8260B<br><i>Select</i>                                       |  | RFPP                          | 200 |
| REMARKS:<br>GW Down Stream 25' 2.0-2.5 ft below sediment   |                 |                  |        |   |                                  |             |  |  |                               |     |
| <b>MATERIAL CODES:</b> AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |                 |                  |        |   |                                  |             |  |  |                               |     |
| <b>SAMPLING EQUIPMENT CODES:</b> APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |                 |                  |        |   |                                  |             |  |  |                               |     |

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH:  $\pm 0.2$  units Temperature:  $\pm 0.2$  °C Specific Conductance:  $\pm 5\%$  Dissolved Oxygen: all readings  $\leq 20\%$  saturation (see Table FS 9000 ~ optionally,  $\pm 0.2$  mg/L or  $\pm 10\%$  (whichever is greater) Turbidity: all readings  $\leq 20$  NTU; optionally  $\pm 5$  NTU or  $\pm 10\%$  (whichever is g

# GROUNDWATER SAMPLING LOG

|                              |                                 |                          |                  |
|------------------------------|---------------------------------|--------------------------|------------------|
| SITE<br>NAME: Cecil / Site 3 |                                 | SITE<br>LOCATION: Site 3 |                  |
| WELL NO: WP. DN25-1015       | SAMPLE ID: CEF-003-WP-DN25 1015 |                          | DATE : 4/19/2011 |

## PURGING DATA

[illegible]

## SAMPLING DATA

| SAMPLED BY (PRINT) / AFFILIATION:<br>Jeff Krone/TINUS Dave Siefken  |              |               |        | SAMPLER(S) SIGNATURE(S):<br><i>[Signature]</i>                |                               |          | SAMPLING INITIATED AT: 1450                                |                         | SAMPLING ENDED AT: 1455               |  |
|---|--------------|---------------|--------|---|-------------------------------|----------|--|-------------------------|---------------------------------------|--|
| PUMP OR TUBING DEPTH IN WELL (feet): 1.25   |              |               |        | TUBING MATERIAL CODE: Teflon Poly (circle one)<br><i>(PE)</i> |                               |          | FIELD-FILTERED: Y <i>(N)</i><br>Filtration Equipment Type: |                         | FILTER SIZE: ____ µm                  |  |
| FIELD DECONTAMINATION: PUMP Y <i>(N)</i> TUBING <i>(Y)</i> N (replaced)   |              |               |        |   |                               |          | DUPLICATE: Y <i>(N)</i>                                    |                         |                                       |  |
| SAMPLE CONTAINER SPECIFICATION  |              |               |        | SAMPLE PRESERVATION   |                               |          | INTENDED ANALYSIS AND/OR METHOD                            | SAMPLING EQUIPMENT CODE | SAMPLE PUMP FLOW RATE (mL per minute) |  |
| SAMPLE ID CODE  | # CONTAINERS | MATERIAL CODE | VOLUME | PRESERVATIVE USED   | TOTAL VOL ADDED IN FIELD (mL) | FINAL pH |  |                         |                                       |  |
| PP  | 3            | CG            | 40 ML  | HCL   | NONE                          | <2       | VOCs (BTEX + MTBE) 8260B                                   | RFPP                    | .                                     |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
|   |              |               |        |   |                               |          |  |                         |                                       |  |
| REMARKS:<br>GW Down Stream 25' @ 1.0 - 1.5 ft below Sediment  |              |               |        |   |                               |          |  |                         |                                       |  |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |              |               |        |   |                               |          |  |                         |                                       |  |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailor; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |              |               |        |   |                               |          |  |                         |                                       |  |

**NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.**

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

**pH:**  $\pm 0.2$  units **Temperature:**  $\pm 0.2$  °C **Specific Conductance:**  $\pm 5\%$  **Dissolved Oxygen:** all readings  $\leq 20\%$  saturation (see Table FS 2200-2); optionally,  $\pm 0.2$  mg/L or  $\pm 10\%$  (whichever is greater) **Turbidity:** all readings  $\leq 20$  NTU; optionally  $+ 5$  NTU or  $\pm 10\%$  (whichever is greater)

## Revision Date: February 12, 2009 Form FD 9000-24

# GROUNDWATER SAMPLING LOG

|                              |                                  |                                 |  |
|------------------------------|----------------------------------|---------------------------------|--|
| SITE<br>NAME: Cecil / Site 3 |                                  | SITE<br>LOCATION: <b>Site 3</b> |  |
| WELL NO: WP DN 25 0510       | SAMPLE ID: CEF-003-WP-DN 25 0510 | DATE : 4/19/2011                |  |

## PURGING DATA

[illegible]

## SAMPLING DATA

|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|---|--------------|---------------|--------|---|-------------------------------|-------------------------|--|--|-------------------------|--|---------------------------------------|--|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Jeff Krone/TINUS   |              |               |        | SAMPLER(S) SIGNATURE(S):<br>                                  |                               |                         | SAMPLING INITIATED AT: 1515                                |  | SAMPLING ENDED AT: 1520 |  |                                       |  |
| PUMP OR TUBING DEPTH IN WELL (feet): 0.75   |              |               |        | TUBING MATERIAL CODE: Teflon Poly (circle one)<br><u>(PP)</u> |                               |                         | FIELD-FILTERED: Y <u>(N)</u><br>Filtration Equipment Type: |  | FILTER SIZE: _____ µm   |  |                                       |  |
| FIELD DECONTAMINATION: PUMP Y <u>(N)</u> TUBING <u>(Y)</u> N (replaced)   |              |               |        |   |                               | DUPLICATE: Y <u>(N)</u> |  |  |                         |  |                                       |  |
| SAMPLE CONTAINER SPECIFICATION  |              |               |        | SAMPLE PRESERVATION   |                               |                         | INTENDED ANALYSIS AND/OR METHOD                            |  | SAMPLING EQUIPMENT CODE |  | SAMPLE PUMP FLOW RATE (mL per minute) |  |
| SAMPLE ID CODE  | # CONTAINERS | MATERIAL CODE | VOLUME | PRESERVATIVE USED   | TOTAL VOL ADDED IN FIELD (mL) | FINAL pH                |  |  |                         |  |                                       |  |
| PP  | 3            | CG            | 40 ML  | HCL   | NONE                          | <2                      | VOCs ( <u>BTEX + MTBE</u> ) 8260B<br><u>Select A</u>       |  | RFPP                    |  | 100                                   |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
|   |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
| REMARKS:<br>GW Down stream 25' collected at 0.5 - 1.0 ft below sedimen  |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailor; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |              |               |        |   |                               |                         |  |  |                         |  |                                       |  |

**NOTES:** 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

**pH:**  $\pm 0.2$  units **Temperature:**  $\pm 0.2$  °C **Specific Conductance:**  $\pm 5\%$  **Dissolved Oxygen:** all readings  $\leq 20\%$  saturation (see Table FS 2200-2); optionally,  $+0.2$  mg/L or  $+10\%$  (whichever is greater) **Turbidity:** all readings  $\leq 20$  NTU; optionally  $+5$  NTU or  $+10\%$  (whichever is greater)

Revision Date: February 12, 2009 Form FD 9000-24  
**GROUNDWATER SAMPLING LOG**

|                              |                             |                          |  |
|------------------------------|-----------------------------|--------------------------|--|
| SITE<br>NAME: Cecil / Site 3 |                             | SITE<br>LOCATION: Site 3 |  |
| WELL NO: WP-DN 25            | SAMPLE ID: CEF-003-WP-DN 25 | DATE: 4/19/2011          |  |

**PURGING DATA**

|   |  |   |                                  |  |                           |               |                                     |   |                     |                     |                    |
|---|--|---|----------------------------------|--|---------------------------|---------------|-------------------------------------|---|---------------------|---------------------|--------------------|
| WELL<br>DIAMETER (inches): 1  | TUBING<br>DIAMETER (inches): 3/16                  | WELL SCREEN INTERVAL<br>DEPTH: 0.0 feet to 0.5 feet | STATIC DEPTH<br>TO WATER (feet): | PURGE PUMP TYPE<br>OR BAILER: Peristaltic Pump |                           |               |                                     |   |                     |                     |                    |
| <b>WELL VOLUME PURGE:</b> 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY<br>(only fill out if applicable)<br>= (                      feet -                      feet ) X                      liters/foot =                      liters   |  |   |                                  |  |                           |               |                                     |   |                     |                     |                    |
| <b>EQUIPMENT VOLUME PURGE:</b> 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME<br>(only fill out if applicable)<br>=                      liters + (                      liters/foot X                      feet ) +                      liters =                      liters   |  |   |                                  |  |                           |               |                                     |   |                     |                     |                    |
| INITIAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.25  | FINAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.25 | PURGING<br>INITIATED AT: 1500                       | PURGING<br>ENDED AT: 1530        | TOTAL VOLUME<br>PURGED (liters): 12            |                           |               |                                     |   |                     |                     |                    |
| TIME  | VOLUME<br>PURGED<br>(gallons)                      | CUMUL.<br>VOLUME<br>PURGED<br>(gallons)             | PURGE<br>RATE<br>(gpm)           | DEPTH<br>TO<br>WATER<br>(feet)                 | pH<br>(standard<br>units) | TEMP.<br>(°C) | COND.<br>(circle units)<br>µmhos/cm | DISSOLVED<br>OXYGEN<br>(circle units)<br>mg/L or % saturation | TURBIDITY<br>(NTUs) | COLOR<br>(describe) | ODOR<br>(describe) |
| 1500  | 0  | 0   | 300                              | NA   |                           |               |                                     |   |                     |                     |                    |
| 1520  | 6  | 6   | 300                              | NA   | 7.57                      | 26.65         | 0.164                               | 66.8  | 30.26               | CL                  | 96.5               |
| 1525  | 3  | 9   | 300                              | NA   | 7.65                      | 26.76         | 0.162                               | 66.8  | 12.78               | CL                  | 90.7               |
| 1530  | 3  | 12  | 300                              | NA   | 7.64                      | 26.71         | 0.162                               | 66.6  | 11.62               | CL                  | 91.9               |
| 1530 SAMPLE   |  |   |                                  |  |                           |               |                                     |   |                     |                     |                    |
| <b>WELL CAPACITY</b> (Liters Per Foot): 0.75" = 0.0757; 1" = 0.151; 1.25" = 0.227; 2" = 0.605; 3" = 0.37; 4" = 1.40; 5" = 3.861; 6" = 5.564; 12" = 22.25<br><b>TUBING INSIDE DIA. CAPACITY</b> (Ltr./Ft.): 1/8" = 0.00227; 3/16" = 0.00529; 1/4" = 0.00984; 5/16" = 0.0151; 3/8" = 0.0227; 1/2" = 0.0378; 5/8" = 0.0605 |  |   |                                  |  |                           |               |                                     |   |                     |                     |                    |
| <b>PURGING EQUIPMENT CODES:</b> B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)  |  |   |                                  |  |                           |               |                                     |   |                     |                     |                    |

**SAMPLING DATA**

|  |                 |                  |        |   |                                  |             |                          |   |      |                               |     |
|--|-----------------|------------------|--------|---|----------------------------------|-------------|--------------------------|---|------|-------------------------------|-----|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Jeff Krone/TINUS Dave Siefner   |                 |                  |        | SAMPLER(S) SIGNATURE(S):<br>[Signature]           |                                  |             |                          | SAMPLING<br>INITIATED AT: 1530  |      | SAMPLING<br>ENDED AT: 1535    |     |
| PUMP OR TUBING<br>DEPTH IN WELL (feet): 0.25   |                 |                  |        | TUBING<br>MATERIAL CODE: Teflon Poly (circle one) |                                  |             |                          | FIELD-FILTERED: Y <input checked="" type="checkbox"/><br>Filtration Equipment Type: |      | FILTER SIZE:      µm          |     |
| FIELD DECONTAMINATION: PUMP Y <input checked="" type="checkbox"/> TUBING Y <input checked="" type="checkbox"/> N (replaced)  |                 |                  |        | DUPLICATE: Y <input checked="" type="checkbox"/>  |                                  |             |                          |   |      |                               |     |
| SAMPLE CONTAINER SPECIFICATION   |                 |                  |        | SAMPLE PRESERVATION                               |                                  |             |                          | INTENDED<br>ANALYSIS AND/OR<br>METHOD   |      | SAMPLING<br>EQUIPMENT<br>CODE |     |
| SAMPLE<br>ID CODE  | #<br>CONTAINERS | MATERIAL<br>CODE | VOLUME | PRESERVATIVE<br>USED                              | TOTAL VOL<br>ADDED IN FIELD (mL) | FINAL<br>pH |                          |   |      |                               |     |
| PP   | 3               | CG               | 40 ML  | HCL   | NONE                             | <2          | VOCs (BTEX + MTBE) 8260B |   | RFPP |                               | 100 |
|  |                 |                  |        |   |                                  |             | Select ↑                 |   |      |                               |     |
| REMARKS:<br>GLW Down Stream 25' collected at 0.0 - 0.5 ft below sediment   |                 |                  |        |   |                                  |             |                          |   |      |                               |     |
| <b>MATERIAL CODES:</b> AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |                 |                  |        |   |                                  |             |                          |   |      |                               |     |
| <b>SAMPLING EQUIPMENT CODES:</b> APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |                 |                  |        |   |                                  |             |                          |   |      |                               |     |

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

## Revision Date: February 12, 2009 Form FD 9000-24

# GROUNDWATER SAMPLING LOG

|                              |                              |                                 |           |
|------------------------------|------------------------------|---------------------------------|-----------|
| SITE<br>NAME: Cecil / Site 3 |                              | SITE<br>LOCATION: <b>Site 3</b> |           |
| WELL NO: WP-ORG-R5           | SAMPLE ID: CEF-003-WP-ORG-R5 | DATE :                          | 4/19/2011 |

## PURGING DATA

|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|---|---|--|------------------------|---|---------------------------|-------------------------------------|---|--|---------------------|---------------------|--------------------|
| WELL<br>DIAMETER (inches): 1  |   | TUBING<br>DIAMETER (inches): 3/16                  |                        | WELL SCREEN INTERVAL<br>DEPTH: 2 feet to 2.5 feet |                           | STATIC DEPTH<br>TO WATER (feet): NA |   | PURGE PUMP TYPE<br>OR BAILER: Peristaltic Pump                   |                     |                     |                    |
| <b>WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY</b><br>(only fill out if applicable)<br>$= ( \quad \text{feet} - \quad \text{feet} ) \times \quad \text{liters/foot} = \quad \text{liters}$  |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
| <b>EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME</b><br>(only fill out if applicable)<br>$= \quad \text{liters} + ( \quad \text{liters/foot} \times \quad \text{feet} ) + \quad \text{liters} = \quad \text{liters}$                                    |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
| INITIAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25  |   | FINAL PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25 |                        | PURGING<br>INITIATED AT: 1600                     |                           | PURGING<br>ENDED AT: 1630           |   | TOTAL VOLUME<br>PURGED (liters): 1.1                             |                     |                     |                    |
| TIME  | VOLUME<br>PURGED<br>(gallons)                   | CUMUL.<br>VOLUME<br>PURGED<br>(gallons)            | PURGE<br>RATE<br>(gpm) | DEPTH<br>TO<br>WATER<br>(feet)                    | pH<br>(standard<br>units) | TEMP.<br>(°C)                       | COND.<br>(circle units)<br>µmhos/cm<br>or µS/cm | DISSOLVED<br>OXYGEN<br>(circle units)<br>mg/L or<br>% saturation | TURBIDITY<br>(NTUs) | COLOR<br>(describe) | ODOR<br>(describe) |
| 1600  | 0   | 0  | 100                    | NA  |                           |                                     |   |  |                     |                     |                    |
|   | Purged Dry (4) times. Not enough for Flow cell. |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
| 1630  | SAMPLE  |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
|   |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
| <b>WELL CAPACITY (Liters Per Foot):</b> 0.75" = 0.0757; 1" = 0.151; 1.25" = 0.227; 2" = 0.605; 3" = 0.37; 4" = 1.40; 5" = 3.861; 6" = 5.564; 12" = 22.25<br><b>TUBING INSIDE DIA. CAPACITY (Ltr./Ft.):</b> 1/8" = 0.00227; 3/16" = 0.00529; 1/4" = 0.00984; 5/16" = 0.0151; 3/8" = 0.0227; 1/2" = 0.0378; 5/8" = 0.0605 |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |
| <b>PURGING EQUIPMENT CODES:</b> B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)  |   |  |                        |   |                           |                                     |   |  |                     |                     |                    |

## SAMPLING DATA

|   |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
|---|--|-----------------|------------------|---|----------------------|----------------------------------|--|-----------------------------|-------------------------------|------|---|-----|
| SAMPLED BY (PRINT) / AFFILIATION:<br>Jeff Krone/TINUS   |  |                 |                  | SAMPLER(S) SIGNATURE(S):<br><i>DR</i>                       |                      |                                  | SAMPLING<br>INITIATED AT: 1630                           |                             | SAMPLING<br>ENDED AT: 1635    |      |   |     |
| PUMP OR TUBING<br>DEPTH IN WELL (feet): 2.25  |  |                 |                  | TUBING<br>MATERIAL CODE: Teflon Poly (circle one) <i>PE</i> |                      |                                  | FIELD-FILTERED: Y <i>N</i><br>Filtration Equipment Type: |                             | FILTER SIZE: _____ µm         |      |   |     |
| FIELD DECONTAMINATION: PUMP Y <i>N</i>  |  |                 |                  | TUBING <i>Y</i> N (replaced)                                |                      |                                  | DUPLICATE: Y <i>N</i>                                    |                             |                               |      |   |     |
| SAMPLE CONTAINER SPECIFICATION  |  |                 |                  | SAMPLE PRESERVATION   |                      |                                  | INTENDED<br>ANALYSIS AND/OR<br>METHOD                    |                             | SAMPLING<br>EQUIPMENT<br>CODE |      | SAMPLE PUMP<br>FLOW RATE<br>(mL per minute) |     |
| SAMPLE<br>ID CODE   |  | #<br>CONTAINERS | MATERIAL<br>CODE | VOLUME  | PRESERVATIVE<br>USED | TOTAL VOL<br>ADDED IN FIELD (mL) | FINAL<br>pH  | VOCs (BTEX +<br>MPDE) 8260B |                               | RFPP |   | 100 |
| PP  |  | 3               | CG               | 40 ML   | HCL                  | NONE                             | <2   | Select ↑                    |                               |      |   |     |
|   |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
|   |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
|   |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
|   |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
|   |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
|   |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
| REMARKS:<br>Drove SS TW Point to 2.5 ft below sediment / Land surface at edge of c  |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
| MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)  |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |
| SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailor; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify) |  |                 |                  |   |                      |                                  |  |                             |                               |      |   |     |

**NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.**

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

**pH:**  $\pm 0.2$  units **Temperature:**  $\pm 0.2$  °C **Specific Conductance:**  $\pm 5\%$  **Dissolved Oxygen:** all readings  $\leq 20\%$  saturation (see Table FS 2200-2); optionally,  $\pm 0.2$  mg/L or  $\pm 10\%$  (whichever is greater) **Turbidity:** all readings  $\leq 20$  NTU; optionally  $\pm 5$  NTU or  $\pm 10\%$  (whichever is greater)





# Site 3 Creek Sampling

4-19-11

Personnel : Dave, Stephen & Rob Simich  
 PPE : Level "D"  
 Weather : Pt Sunny 89°F  
 Obj : Collect GW samples below creek bed  
 For lab analysis  
 LAB : Katahdin  
 Analysis : Select VOC

\* Water Level @ CEF-003-31S DTW = 4.24' TOC  
 Total Depth 33.1' TOC  
 Casing: 2.5' Above Ground Level

0815 Checked in with Tower for JAA site access.  
 Discussion w/ Rusty Chandler

0845 Set-up for creek vertical evaluation.

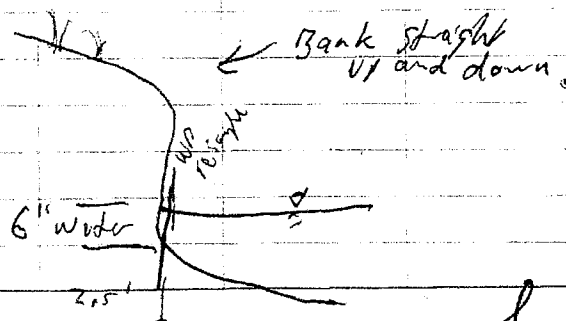
0950 YSI Calibrated  
 HF Scientific Calibrated

Rob is constructing Schedule 40 PVC 10 slot  
 temporary well points w/ 6" screen.

| Checking | Creek   | H <sub>2</sub> O | parameters |
|----------|---------|------------------|------------|
| Temp     | 20.94   | °C               |            |
| pH       | 6.04    |                  |            |
| Cond     | 0.143   | ns/cm            |            |
| DO       | 74.5%   | or 6.64          | mg/L       |
| ORP      | (+) 168 |                  |            |

\* Duplicate Sample CEF-003-WP-DUP01 @  
 CEF-003-WP-UP25-0510

Re sample @ 25' UP Stream location  
 CEF-003-WP-UP25-RS



\* Well dries up during  
 purging.

\* Clean sample after 4<sup>th</sup> purged  
 down after 2.

# Site 3 Creek Sampling

4/19/11

GW Samples to be collected today will be obtained through a temporary well. ~~The~~ Each TW is constructed with 1" Schedule 40 pipe with 6" of Screen. No glue was used in the fabrication of these well. Two sample locations will each have (4) wells ~~installed~~ installed such that the TWs are 2.5 ft from creek bank & 1.0 ft apart. This orientation creates a line of wells parallel to the creek bank. The two sample areas are

- 1) UP 25' & 2) Down (DN) 25'. The depth of the individual TW shall be based on depth below distance the sediment. The (4) depth selected include the following:
  - 1) 0.0 - 0.5 ft
  - 2) 0.5 - 1.0 ft
  - 3) 1.0 - 1.5 ft
  - 4) 2.0 - 2.5 ft

The depth of each sample shall be noted on sample ID by removing the decimal points i.e. 0.0 - 0.5 = 0005 TWs shall be hand driven into sediment & purged like a typical monitoring well.

## Decon

Decon of Stainless Steel (SS) TW is the same as a SS handpump. Liquor - DI - Alcohol - DI. TW screens were allowed to air dry before used.

## WELLS SAMPLE

| Time | ID                    | Depth (ft)             | Comments                                  |
|------|-----------------------|------------------------|---|
| 1145 | CEF-003-WPUP-2025     | 2.0-2.5                | Purged good,                              |
| 1205 | CEF-003-WPUP-1015     | 1.0-1.5                | Purged good.                              |
| 1215 | CEF-003-WPUP-25-0510  | 0.5-1.0                | Purged good (Duplicate 01)                |
| 1230 | CEF-003-WPUP-25-0005  | 0.0-0.5                | Purged good                               |
| 1415 | CEF-003-WPUP-25-RS    | 2.0-2.5                | Poor recharge. TW in hole at edge of bank |
| 1440 | CEF-003-WP-DN-25-2025 | 2.0-2.5                | good purge.                               |
| 1450 | CEF-003-WP-DN-25-1015 | 1.0-1.5                | purged good                               |
| 1515 | CEF-003-WP-DN-25-0510 | 0.5-1.0                | purged good. poor recharge                |
| 1530 | CEF-003-WP-DN-25-0005 | 0.0-0.5                | purged good                               |
| 1630 | CEF-003-WP-ORG-RS     | 2.0-2.5                | purged good. poor recharge                |
| 0000 | CEF-003-WP-DUP-01     | = CEF-003-WPUP-25-0510 |   |

# Site 3 Creek Sampling

4.19.11

1700 Once Samples collected they are placed into cooler w/ ice.

Fed Ex # 8427 - 1834 - 4783

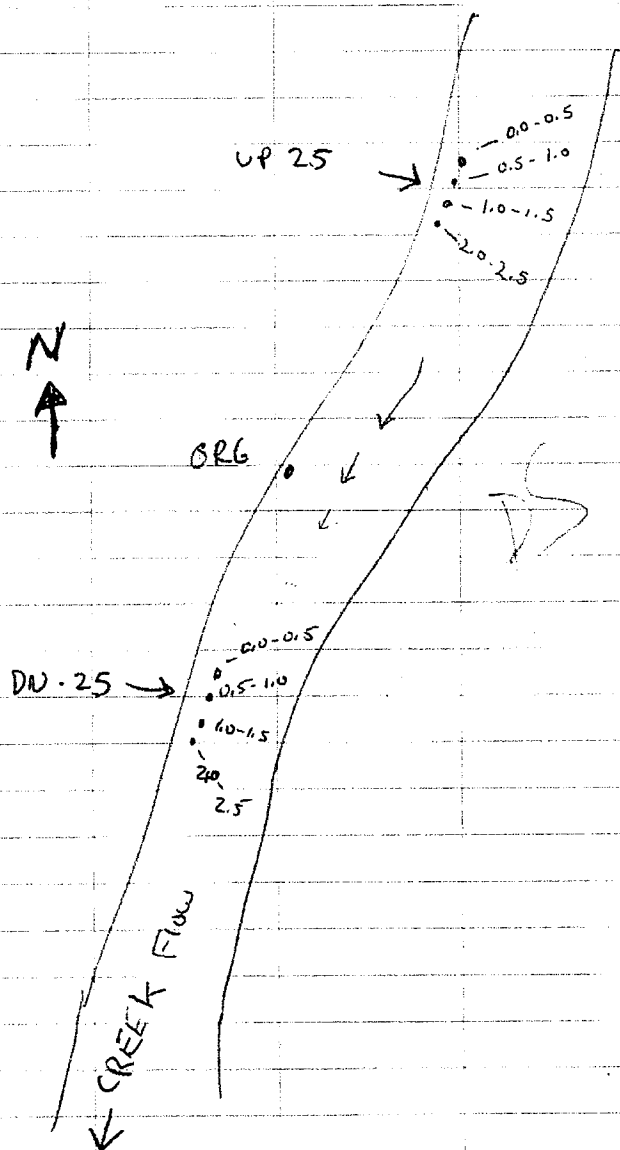
1710 Off to fed Ex Site Secure and picked up trash.

Left green fence posts in place with Sample locations written on orange protective cap. for both locations the most shallow depth below sediments collected was installed up stream. & then we worked to deeper samples.

1810 AT Fed Ex -

1815 off to office

1830 At office off load truck end of Day



rk



TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER

0866

PAGE 1 OF 1

|   |      |                             |             |  |                   |  |   |  |  |              |  |            |  |
|---|------|-----------------------------|-------------|--|-------------------|--|---|--|--|--------------|--|------------|--|
| PROJECT NO:<br>1125002267   |      | FACILITY:<br>Cecil / Site 3 |             | PROJECT MANAGER<br>Rob Simcik                  |                   | PHONE NUMBER<br>604 12 921 8163  |   | LABORATORY NAME AND CONTACT:<br>Katahdin |  |              |  |            |  |
| SAMPLERS (SIGNATURE)<br>  |      |                             |             | FIELD OPERATIONS LEADER<br>Dave Siefken        |                   | PHONE NUMBER<br>904 - 334-7260   |   | ADDRESS<br>600 Technology Way            |  |              |  |            |  |
|   |      |                             |             | CARRIER/WAYBILL NUMBER<br>FEDEX 8427-1834-4783 |                   |  |   | CITY, STATE<br>Scarborough, ME 04074     |  |              |  |            |  |
| STANDARD TAT <input type="checkbox"/><br>RUSH TAT <input type="checkbox"/><br><input type="checkbox"/> 24 hr. <input type="checkbox"/> 48 hr. <input checked="" type="checkbox"/> 72 hr. <input type="checkbox"/> 7 day <input type="checkbox"/> 14 day |      |                             |             |  |                   | CONTAINER TYPE<br>PLASTIC (P) or GLASS (G) <input checked="" type="checkbox"/>                           |   |  |  |              |  |            |  |
|   |      |                             |             |  |                   | PRESERVATIVE<br>USED   |   |  |  |              |  |            |  |
|   |      |                             |             |  |                   | TYPE OF ANALYSIS<br>8260B <input checked="" type="checkbox"/> Select <input checked="" type="checkbox"/> |   |  |  |              |  |            |  |
| DATE<br>YEAR  | TIME | SAMPLE ID                   | LOCATION ID | TOP DEPTH (FT)                                 | BOTTOM DEPTH (FT) | MATRIX (GW, SO, SW, SD, QC, ETC.)  | COLLECTION METHOD<br>GRAB (G)<br>COMP (C) | No. OF CONTAINERS                        | COMMENTS   |              |  |            |  |
| 4/19  | 1145 | CEF-003-WP-UP25-2025        | 2'-2.5'     | 20'  | 2.5'              | GW   | G   | 3  | <input checked="" type="checkbox"/> Select VOC <input checked="" type="checkbox"/> |              |  |            |  |
| 4/19  | 1205 | CEF-003-WP-UP25-1015        | 1'-1.5'     | 1.0'   | 1.5'              | GW   | G   | 3  | 1,1 DCE  |              |  |            |  |
| 4/19  | 1215 | CEF-003-WP-UP25-0510        | 0.5'-1'     | 0.5'   | 1.0'              | GW   | G   | 3  | 1,2 DCB  |              |  |            |  |
| 4/19  | 1220 | CEF-003-WP-DVPO1            | —           | —  | —                 | GW   | G   | 3  | 1,4 DCB  |              |  |            |  |
| 4/19  | 1230 | CEF003-WP-UP25-0005         | 0'-0.5'     | 0.0'   | 0.5'              | GW   | G   | 3  | Napthalene   |              |  |            |  |
| 4/19  | 1415 | CEF-003-WP-UP25-RS          | 2'-2.5'     | 2.0'   | 2.5'              | GW   | G   | 3  | Trichloroethene  |              |  |            |  |
| 4/19  | 1510 | CEF003-WP-DN25-0510         | 0.5'-1'     | 0.5'   | 1.0'              | GW   | G   | 3  | Cis-1,2 Dichloroethene   |              |  |            |  |
| 4/19  | 1445 | CEF-003-WP-DN25-2025        | 2'-2.5'     | 2.0'   | 2.5'              | GW   | G   | 3  | VC   |              |  |            |  |
| 4/19  | 1455 | CEF-003-WP-DN25-1015        | 1'-1.5'     | 1.0'   | 1.5'              | GW   | G   | 3  |  |              |  |            |  |
| 4/19  | 1535 | CEF-003-WP-DN25-0005        | 0'-0.5'     | 0.0'   | 0.5'              | GW   | G   | 3  |  |              |  |            |  |
| 4/19  | 1630 | CEF-003-WP-ORG-RS           | 2'-2.5'     | 2.0'   | 2.5'              | GW   | G   | 3  |  |              |  |            |  |
| 1. RELINQUISHED BY  |      |                             |             | DATE 4/19/11                                   |                   | TIME 1800  |   | 1. RECEIVED BY                           |  | DATE 4-20-11 |  | TIME 15:00 |  |
| 2. RELINQUISHED BY  |      |                             |             | DATE   |                   | TIME   |   | 2. RECEIVED BY                           |  | DATE         |  | TIME       |  |
| 3. RELINQUISHED BY  |      |                             |             | DATE   |                   | TIME   |   | 3. RECEIVED BY                           |  | DATE         |  | TIME       |  |
| COMMENTS  |      |                             |             |  |                   |  |   |  |  |              |  |            |  |

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4/02R  
FORM NO. TINUS-001



**ATTACHMENT 4**

**SITE 3 DPT WITH MOBILE LABORATORY WORK PLAN,  
ANALYTICAL RESULTS, SUMMARY TABLE, AND FIELD PAPERWORK BACKUP**

**From:** Simcik, Robert

**Sent:** Thursday, June 16, 2011 5:34 PM

**To:** Sanford, Art F CTR OASN (EI&E), BRAC PMO SE; [mark.e.davidson@navy.mil](mailto:mark.e.davidson@navy.mil); Martin, Stacin CIV NAVFAC LANT, EV; [Vaughn-Wright.Debbie@epamail.epa.gov](mailto:Vaughn-Wright.Debbie@epamail.epa.gov); Grabka, David; Jonnet, Mark; 'Michael.Halil@CH2M.com'; Jessica Dehart

**Cc:** Boerio, Megan; Siefken, David; Wimble, Kara; Kelly, Chuck; Simcik, Robert

**Subject:** Cecil Field \_ Information on Site 3 DPT effort

Team, in support of the Site 3 Pilot Test design, Tt was tasked at May BCT meeting (Meeting Minute 2678; Decision 810) to conduct DPT w/ mobile lab sampling and analysis to determine the vertical and horizontal limits of the VC plume in the area of the proposed system (approximately 20 to 40 feet west of the center line of Rowell creek). The intent of this e-mail is to provide some additional information regarding the planned field effort that wasn't provided at the May BCT meeting.

The attached Figure is an aerial view with the Well Point sample locations and results. The proposed groundwater sampling strategy will begin at the original location +0 (WP and MW-31S) and step out parallel to the creek in 25' increments. The attached Figure identifies these DPT locations according to the distance from the original sample location which is assigned the ID of +0.

A DPT drilling contractor and an approved mobile analytical laboratory vendor will be procured to collect and analyze the groundwater samples under the direct supervision of Tt.

Site clearing will be conducted to gain access to the proposed DPT sampling locations (a Clearing contractor is currently being procured and we are working with JAA and Forestry regarding any restrictions). Obviously a utility clearance will also be conducted.

The first DPT sampling location will be at the original sample location (+0, next to CEF-003-31S). This location will be used to identify the vertical extent of contamination, currently observed at the 20' to 30' bgs interval. Groundwater samples will be collected in five foot intervals to a depth of 50 feet bgs using the sealed screen sampling method as described in the Groundwater Sampling and Monitoring with Direct Push Technologies (OSWER No. 9200.1-51, EPA 540/R- 04/2005), attached. The sealed screen method was selected because we anticipate reducing the number of sampling intervals from ten at the first location to approximately four at the other locations and are confident that we can control potential cross contamination and drag-down with proper decontamination using this method. We selected the last groundwater sample to be collected at the 50' depth (screen interval of 48' to 52' with tubing at 50') based on no contamination detected in the deep monitoring well CEF-003-32D [56'-66'] and soil borings in this area (attached) which show a transition to clay ranging from 52' to 46' bgs.

The sealed screen method uses a DPT probe that is equipped with a 4-foot screen that is exposed when the proper groundwater sampling depth is reached. The first sample (5' bgs sample) will have the well screen positioned to depth of 7 feet bgs (screen interval of 3 feet bgs to 7 feet bgs) and the sampling tubing placed at a depth of 5 feet bgs. Groundwater will be purged until clear and the groundwater sample collected will be provided to the on-site mobile lab for VC analysis. Note during the previous WP investigation we analyzed for select VOCs (see e-mail in red below) and the only contaminate detected was VC, therefore only proposing evaluation of this parameter. Samples will continue to be collected at 5 foot intervals with the well screen decontaminated between each sample. The first sample location (+0) will have ten samples collected and analyzed. The next sample location will be 75 feet north (+75) of the original location. This distance was selected because it is the limits of the plume

as it was identified in the RI, as shown on the attached Figure. By the time we begin pushing the rods at this sampling location (+75), we should have the shallow groundwater results from location +0 and therefore will be able to determine at what depth to start collecting groundwater samples. It is assumed we will be collecting groundwater samples at 15', 20', 25', and 30' bgs. The next sample location will be 75 feet south (-75) of the original location and same logic will be used to determine which vertical sample intervals will be collected. If VC contamination is identified at the 75 foot locations above the GCTL of 1.0 ug/L (we selected the GCTL rather than the SWCTL to be conservative), then we will step out 25 feet (to the +/-100 location) and collect groundwater samples at the appropriate vertical intervals. If VC is not detected above the GCTL, then we will step-in 25 feet to the +/-50 sample location. This process of stepping-out or stepping-in at 25 foot increments will continue until the plume is delineated. If concentrations are high during subsequent step-outs then we may select to step-out more than 25'.

Given we did not have enough time at the last BCT meeting to discuss this process in this level of detail I am looking to get input or concurrence regarding the proposed sampling logic and the analysis to be conducted.

The current schedule is to conduct the field effort in July in order to have results to present to the Team at the August BCT meeting.

Here is the old e-mail:

**From:** Simcik, Robert [<mailto:Robert.Simcik@tetrattech.com>]

**Sent:** Monday, March 28, 2011 3:18 PM

**To:** Grabka, David; [Vaughn-Wright.Debbie@epamail.epa.gov](mailto:Vaughn-Wright.Debbie@epamail.epa.gov); Sanford, Art F CTR OASN (EI&E), BRAC PMO SE; [mark.e.davidson@navy.mil](mailto:mark.e.davidson@navy.mil); [stacin.martin@navy.mil](mailto:stacin.martin@navy.mil); Jessica Keener; Jonnet, Mark; [Michael.Halil@CH2M.com](mailto:Michael.Halil@CH2M.com)

**Cc:** Boerio, Megan

**Subject:** RE: Site 3 Pilot Test \_ additional Well Point sampling.

Dave, we reviewed the GCTL exceedences for the wells that have the potential to migrate to the creek and developed the following list of Select VOCs for the Well Point sampling analysis. Note that this "additional sampling to support the pilot test design" does not match the list of select VOC (19) and select SVOCs (6) in the UFP SAP because we are only looking at the parameters which have the potential to impact the surface water. Also analyzing 1,2-Dichlorobenzene and Naphthalene as a VOC, not SVOC, as cost savings measure. Cis doesn't have a SW limit, but I want to see what, if anything is going on with it.

**SW-846 METHOD 8260-B  
ANALYTICAL DETECTION LIMITS  
Volatile Organic Compounds  
NAS Cecil Field**

| Parameter           | 62-777 Minimum<br>surface water<br>criteria |
|---------------------|---|
| <b>VOCs (UG/L)</b>  |   |
| 1,1-DICHLOROETHENE  | 3.2   |
| 1,2-DICHLOROBENZENE | 99  |
| 1,4-DICHLOROBENZENE | 3   |

|                        |      |
|------------------------|------|
| NAPHTHALENE            | 26   |
| TRICHLOROETHENE        | 80.7 |
| CIS-1,2-DICHLOROETHENE | NA   |
| VINYL CHLORIDE         | 2.4  |

Team, let me know if you are OK with the proposed Select VOC list and proposed sampling effort. Currently planning to collect samples on Tuesday and Wednesday, April 5<sup>th</sup> and 6<sup>th</sup>.

Thanks,

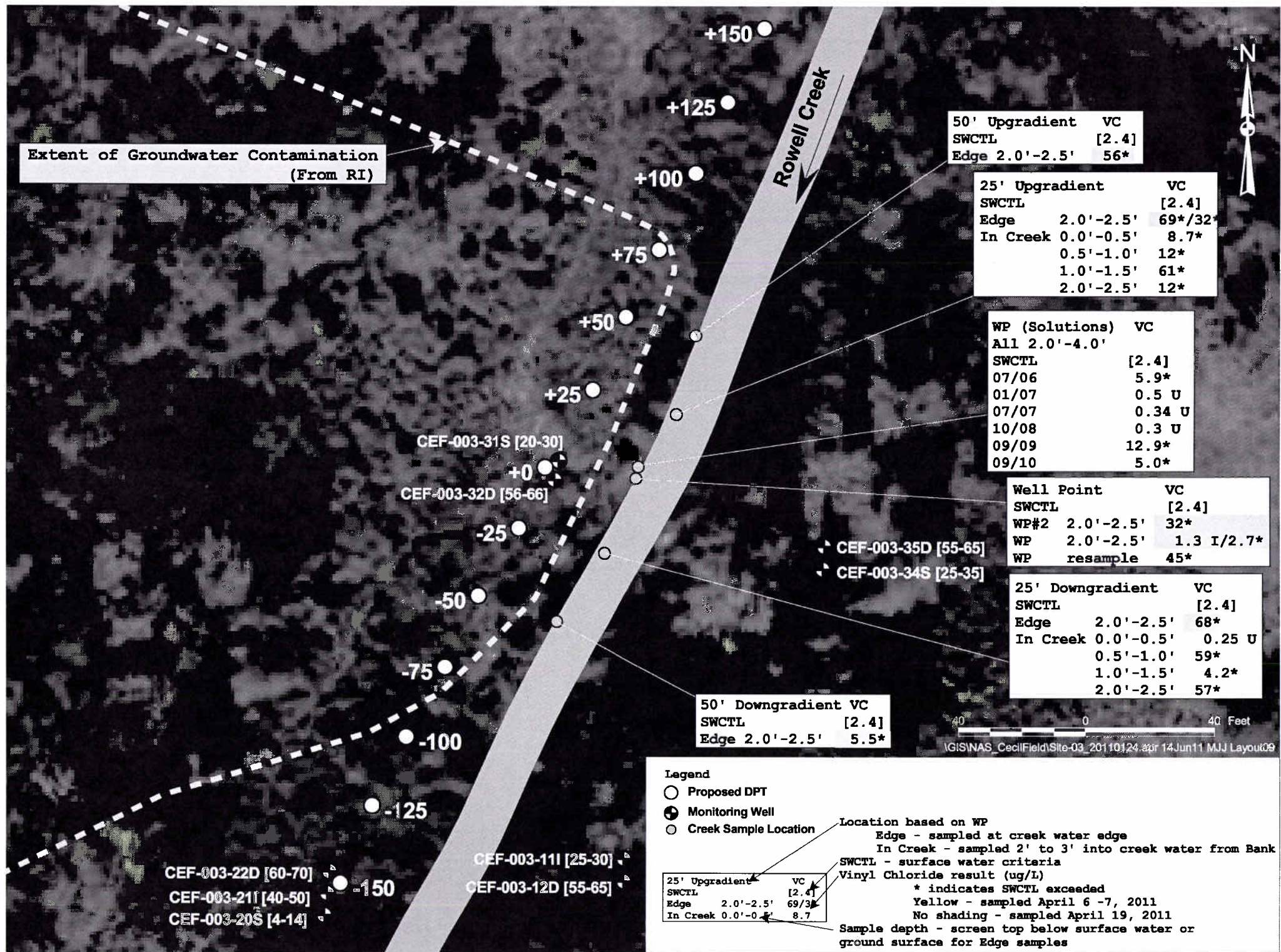
Rob.

**Robert Simcik P.E. | Project Manager**

Direct: 412.921.8163 | Main: 412.921.7090 | Fax: 412.921.4040  
[robert.simcik@tetrattech.com](mailto:robert.simcik@tetrattech.com)

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|  |  |                                 |  |                         |  |                             |  |
|--|--|---------------------------------|--|-------------------------|--|-----------------------------|--|
| PROJECT: NAS Cecil Field RI OUs 1,2,7                |  |                                 |  | LOG of WELL:            |  | LOG OF BORING: GS-3-53      |  |
| CLIENT: SOUTHDIYNAVACENGCOM                          |  |                                 |  |                         |  | PROJECT NO: 7537-03         |  |
| DRILLING SUBCONTRACTOR: Layne Environmental Services |  |                                 |  | DATE STARTED: 10-11-93  |  | COMPLETED: 10-12-93         |  |
| DRILL RIG: Gus Pech BR22                             |  | DRILL MTHD.: 4.25" ID HSA       |  | SAMP. MTHD.: Aqua Probe |  | PROTECTION LEVEL: 0         |  |
| GROUND ELEV.: 54.8 FT. NGVD                          |  | MONITOR INST.: Microtip-PID     |  | TOTAL DEPTH: 71 FT. BLS |  | DEPTH TO $\nabla$ 7 FT. BLS |  |
| LOGGED BY: M. Pijnenburg                             |  | HOLE ABANDONMENT DATE: 10-12-93 |  |                         |  | SITE: 3                     |  |



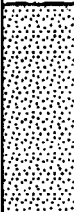
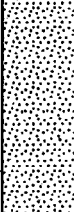

| DEPTH<br>FT. | SAMP. DEPTH<br>/MATRIX. | SAMPLE<br>INTERVAL | BLOWS/8in. | HEADSPACE<br>(ppm) | SOIL/ROCK DESCRIPTION<br>AND COMMENTS   | LITHOLOGIC<br>SYMBOL | SOIL CLASS | REMARKS  |
|--------------|-------------------------|--------------------|------------|--------------------|---|----------------------|------------|--|
|              |                         | 1-1                | 0-2        | 7.4                | 0-52.0 Sand (SP), 100% quartz, medium brown to colorless, fine-grained, sub-angular to sub-rounded, moderately well sorted, soft, occasionally silty. |                      | SP         | 0-8 bis: continuous split-spoons                                   |
|              | 2-4 soil                | 1-1                | 2-4        | 7.4                |   |                      |            |  |
|              |                         | 2-3                | 8.2        |                    |   |                      |            |  |
|              | 4-8 soil                | 3-3                | 4-8        |                    |   |                      |            |  |
| 5            |                         | 2-2                | 9.3        |                    |   |                      |            |  |
|              | 8-10 water              | 4-8                | 8-8        |                    |   |                      |            |  |
|              |                         | 5-8                | 27.3       |                    |   |                      |            |  |
|              |                         | 8-8                |            |                    |   |                      |            |  |
| 10           |                         |                    |            |                    |   |                      |            |  |
| 15           |                         |                    |            |                    |   |                      |            |  |
| 20           | 18-22 water             |                    |            |                    |   |                      |            | w/ sampling string:<br>0<br>w/ augers: dry groundwater encountered |
| 25           |                         |                    |            |                    |   |                      |            |  |
| 30           | 28-32 water             |                    |            |                    |   |                      |            | w/ sampling string:<br>0<br>w/ augers: 17'bis                      |
| 35           |                         |                    |            |                    |   |                      |            |  |
| 40           |                         |                    |            |                    |   |                      |            |  |

|  |  |                                 |                        |                         |                             |
|--|--|---------------------------------|------------------------|-------------------------|-----------------------------|
| PROJECT: NAS Cecil Field RI OUs 1,2,7                |  | LOG of WELL:                    |                        | LOG OF BORING: GS-3-53  |                             |
| CLIENT: SOUTH DIV NAVFACENGCOM                       |  |                                 |                        | PROJECT NO: 7537-03     |                             |
| DRILLING SUBCONTRACTOR: Layne Environmental Services |  |                                 | DATE STARTED: 10-11-93 |                         | COMPLETED: 10-12-93         |
| DRILL RIG: Gus Pech BR22                             |  | DRILL MTHD.: 4.25" ID HSA       |                        | SAMP. MTHD.: Aqua Probe | PROTECTION LEVEL: D         |
| GROUND ELEV.: 54.8 FT. NGVD                          |  | MONITOR INST.: Microtip-PID     |                        | TOTAL DEPTH: 71 FT. BLS | DEPTH TO $\nabla$ 7 FT. BLS |
| LOGGED BY: M. Pinenburg                              |  | HOLE ABANDONMENT DATE: 10-12-93 |                        |                         | SITE: 3                     |

| DEPTH<br>FT. | SAMP. DEPTH<br>/MATRIX. | SAMPLE<br>INTERVAL | BLOWS/8in. | HEADSPACE<br>(ppm) | SOIL/ROCK DESCRIPTION<br>AND COMMENTS<br>Continued from PAGE 1                                     | LITHOLOGIC<br>SYMBOL | SOIL CLASS | REMARKS  |
|--------------|-------------------------|--------------------|------------|--------------------|--|----------------------|------------|--|
| 45           |                         |                    |            |                    | Sand continued.  |                      | SP         |  |
| 50           |                         |                    |            |                    |  |                      |            |  |
| 52-58        | water                   |                    |            |                    | 520-71.0 Sandy Clay (CL), 100% quartz, gray to gray-green, plastic, soft, dense, sandy, moist.     |                      | CL         | w/ sampling string<br>55' bls<br>w/ augers: 2' bls   |
| 55           |                         |                    |            |                    |  |                      |            |  |
| 60           |                         |                    |            |                    |  |                      |            |  |
| 65           |                         |                    |            |                    |  |                      |            |  |
| 70           | 70-71<br>water          |                    |            |                    | Samples collected were analyzed for USEPA Method 8010/8020 and TPH.<br><br>End of boring: 77' bls. |                      |            | bottom bottom hole augers<br>w/ sampling string<br>69' bls<br>w/ augers: 5' bls<br>bottom hole probe |
| 75           |                         |                    |            |                    |  |                      |            |  |
| 80           |                         |                    |            |                    |  |                      |            |  |

|  |  |                                 |  |                          |  |                             |  |
|--|--|---------------------------------|--|--------------------------|--|-----------------------------|--|
| PROJECT: NAS Cecil Field RI OUs 1,2,7                |  |                                 |  | LOG of WELL:             |  | LOG OF BORING: GS-3-70      |  |
| CLIENT: SOUTHDIYNAVFACENGCOM                         |  |                                 |  |                          |  | PROJECT NO: 7537-03         |  |
| DRILLING SUBCONTRACTOR: Layne Environmental Services |  |                                 |  | DATE STARTED: 10-29-93   |  | COMPLETED: 11-01-93         |  |
| DRILL RIG: Gus Pech BR22                             |  | DRILL MTHD.: 4.25" ID HSA       |  | SAMP. MTHD.: Aqua Probe  |  | PROTECTION LEVEL: 0         |  |
| GROUND ELEV.: 58.7 FT. NGVD                          |  | MONITOR INST.: Microtip-PID     |  | TOTAL DEPTH: 108 FT. BLS |  | DEPTH TO $\nabla$ 7 FT. BLS |  |
| LOGGED BY: M. Pijnenburg                             |  | HOLE ABANDONMENT DATE: 11-01-93 |  |                          |  | SITE: 3                     |  |

| DEPTH<br>FT. | SAMP. DEPTH<br>/MATRIX. | SAMP.<br>INTERVAL | BLOWS/Bin. | HEADSPACE<br>(ppm) | SOIL/ROCK DESCRIPTION<br>AND COMMENTS   | LITHOLOGIC<br>SYMBOL   | SOIL CLASS | REMARKS                                     |
|--------------|-------------------------|-------------------|------------|--------------------|---|--|------------|---|
| 5            | 0-2<br>soil             |                   | 0-2        | 0-2                | 0-8.0 Sand (SP), 100% quartz, medium to light brown, fine-to medium-grained, sub-rounded, poorly to moderately well sorted, occasionally silty. |    | SP         | 0-8.0 ft. continuous split-spoons           |
|              |                         |                   | 4-1        | 18.8               |   |  |            |   |
|              |                         |                   | 1-2        | 2-4                |   |  |            |   |
|              |                         |                   | 3-5        | 18                 |   |  |            |   |
|              |                         |                   | 5-4        | 4-6                |   |  |            |   |
| 8            | 4-6<br>soil             |                   | 4-6        | 23.4               | 8.0-8.0 Clayey Sand (SC), 100% quartz, medium gray, fine-grained, sub-rounded, moderately well sorted, clayey.                                  |    | SC         | groundwater encountered                     |
|              |                         |                   | 4-2        | 8-8                |   |  |            |   |
|              |                         |                   | 5-7        | 18.8               |   |  |            |   |
| 10           | 8-12<br>water           |                   | 8-10       |                    | 8.0-48.0 Sand (SP), 100% quartz, light brown, medium-grained, sub-rounded, moderately well sorted, occasionally silty.                          |   | SP         | w/ sampling string<br>0<br>w/ augers: dry   |
|              |                         |                   |            |                    |   |  |            |   |
| 20           | 18-22<br>water          |                   |            |                    |   |  |            | w/ sampling string<br>0<br>w/ augers: dry   |
|              |                         |                   |            |                    |   |  |            |   |
| 30           | 28-32<br>water          |                   |            |                    |   |  |            | w/ sampling string<br>0<br>w/ augers: 27bls |
|              |                         |                   |            |                    |   |  |            |   |
| 40           |                         |                   |            |                    |   |  |            |   |

|  |                                 |                          |                             |                        |                     |
|--|---------------------------------|--------------------------|-----------------------------|------------------------|---------------------|
| PROJECT: NAS Cecil Field RI OUs 1,2,7                |                                 | LOG of WELL:             |                             | LOG OF BORING: GS-3-70 |                     |
| CLIENT: SOUTHDIYNAVFACENGCOM                         |                                 |                          |                             | PROJECT NO: 7537-03    |                     |
| DRILLING SUBCONTRACTOR: Layne Environmental Services |                                 |                          | DATE STARTED: 10-29-93      |                        | COMPLETED: 11-01-93 |
| DRILL RIG: Gus Pech BR22                             | DRILL MTHD.: 4.25" ID HSA       | SAMP. MTHD.: Aqua Probe  | PROTECTION LEVEL: D         |                        |                     |
| GROUND ELEV.: 56.7 FT. NGVD                          | MONITOR INST.: Microtip-PID     | TOTAL DEPTH: 106 FT. BLS | DEPTH TO $\nabla$ 7 FT. BLS |                        |                     |
| LOGGED BY: M. Pilnenburg                             | HOLE ABANDONMENT DATE: 11-01-93 |                          |                             | SITE: 3                |                     |

| DEPTH<br>FT. | SAMP. DEPTH<br>/MATRIX | SAMPLE<br>INTERVAL | BLOWS/8in. | HEADSPACE<br>(ppm) | SOIL/ROCK DESCRIPTION<br>AND COMMENTS<br>Continued from PAGE 1  | LITHOLOGIC<br>SYMBOL | SOIL CLASS | REMARKS   |
|--------------|------------------------|--------------------|------------|--------------------|---|----------------------|------------|---|
| 45           |                        |                    |            |                    | Sand continued.   |                      | SP         |   |
| 50           | 52-58<br>water         |                    |            |                    | 48.0-49.0 Sandy Clay (CL), 100% quartz, medium gray, dense, moist to wet,<br>plastic, pliable, grades to clayey sand.   |                      | CL         | w/ sampling string<br>0<br>w/ augers: 28' b/s       |
| 55           |                        |                    |            |                    |   |                      |            |   |
| 60           |                        |                    |            |                    |   |                      |            |   |
| 65           |                        |                    |            |                    |   |                      |            |   |
| 70           | 68-69<br>water         |                    |            |                    | 69.0-72.0 Clayey Sand (SC) with Shell and Marl clayey sand, 70% quartz,<br>medium gray, fine-to medium-grained, sub-rounded, moderately well sorted;<br>shell, 20% very pale orange, fine fragments: marl, 10% white, calcareous,<br>soft, wet. |                      | SC<br>MARL | w/ sampling string<br>38' b/s<br>w/ augers: 34' b/s |
| 75           |                        |                    |            |                    |   |                      |            |   |
| 80           | 80-82<br>water         |                    |            |                    |   |                      |            | w/ sampling string<br>68' b/s                       |

|  |                                 |                          |                                  |                        |                     |
|--|---------------------------------|--------------------------|----------------------------------|------------------------|---------------------|
| PROJECT: NAS Cecil Field RI OUs 1,2,7                |                                 | LOG of WELL:             |                                  | LOG OF BORING: GS-3-70 |                     |
| CLIENT: SOUTH DIV NAVFACENGCOM                       |                                 |                          |                                  | PROJECT NO: 7537-03    |                     |
| DRILLING SUBCONTRACTOR: Layne Environmental Services |                                 |                          | DATE STARTED: 10-29-93           |                        | COMPLETED: 11-01-93 |
| DRILL RIG: Gus Pech BR22                             | DRILL NTHD.: 4.25" ID HSA       | SAMP. NTHD.: Aqua Probe  | PROTECTION LEVEL: D              |                        |                     |
| GROUND ELEV.: 58.7 FT. NGVD                          | MONITOR INST.: Microtip-PID     | TOTAL DEPTH: 106 FT. BLS | DEPTH TO $\frac{1}{2}$ 7 FT. BLS |                        |                     |
| LOGGED BY: M. Pijnenburg                             | HOLE ABANDONMENT DATE: 11-01-93 |                          |                                  | SITE: 3                |                     |

| DEPTH<br>FT. | SAMP. DEPTH<br>/MATRIX. | SAMPLE<br>INTERVAL | BLOWS/6in. | HEADSPACE<br>(DDM) | SOIL/ROCK DESCRIPTION<br>AND COMMENTS<br>Continued from PAGE 2   | LITHOLOGIC<br>SYMBOL | SOIL CLASS | REMARKS  |
|--------------|-------------------------|--------------------|------------|--------------------|--|----------------------|------------|--|
| 85           |                         |                    |            |                    | Clayey Sand with Shell and Marl continued.   |                      |            |  |
|              |                         |                    |            |                    | 82.0-98.0 Dolomite, 100%, moderate yellowish-brown, hard, well cemented, microcrystalline, shell replacement features visible, vuggy, sucroic, oolitic-like-replacement features visible, trace phosphate. |                      | SC<br>MARL | bottom hole augers   |
|              |                         |                    |            |                    |  |                      | LOLOMITE   | pump rate 6-7 min/ft   |
| 90           | 90-92<br>water          |                    |            |                    |  |                      |            | pump rate 4-5 min/ft<br>temporary well point<br>500 gal purged<br>pump rate 4-5 min/ft |
| 95           |                         |                    |            |                    |  |                      |            |  |
|              |                         |                    |            |                    | 98.0-108.0 Clay (CH), 100%, calcareous, white to light gray, soft, non plastic, wet.   |                      | CH         | pump rate 30 sec/ft  |
| 100          |                         |                    |            |                    |  |                      |            |  |
| 105          |                         |                    |            |                    | Samples collected were analyzed for USEPA Method 8010/8020 and TPH.  |                      |            |  |
|              |                         |                    |            |                    | End of boring: 106' bls.   |                      |            | bottom hole rotary bit   |
| 110          |                         |                    |            |                    |  |                      |            |  |
| 115          |                         |                    |            |                    |  |                      |            |  |
| 120          |                         |                    |            |                    |  |                      |            |  |

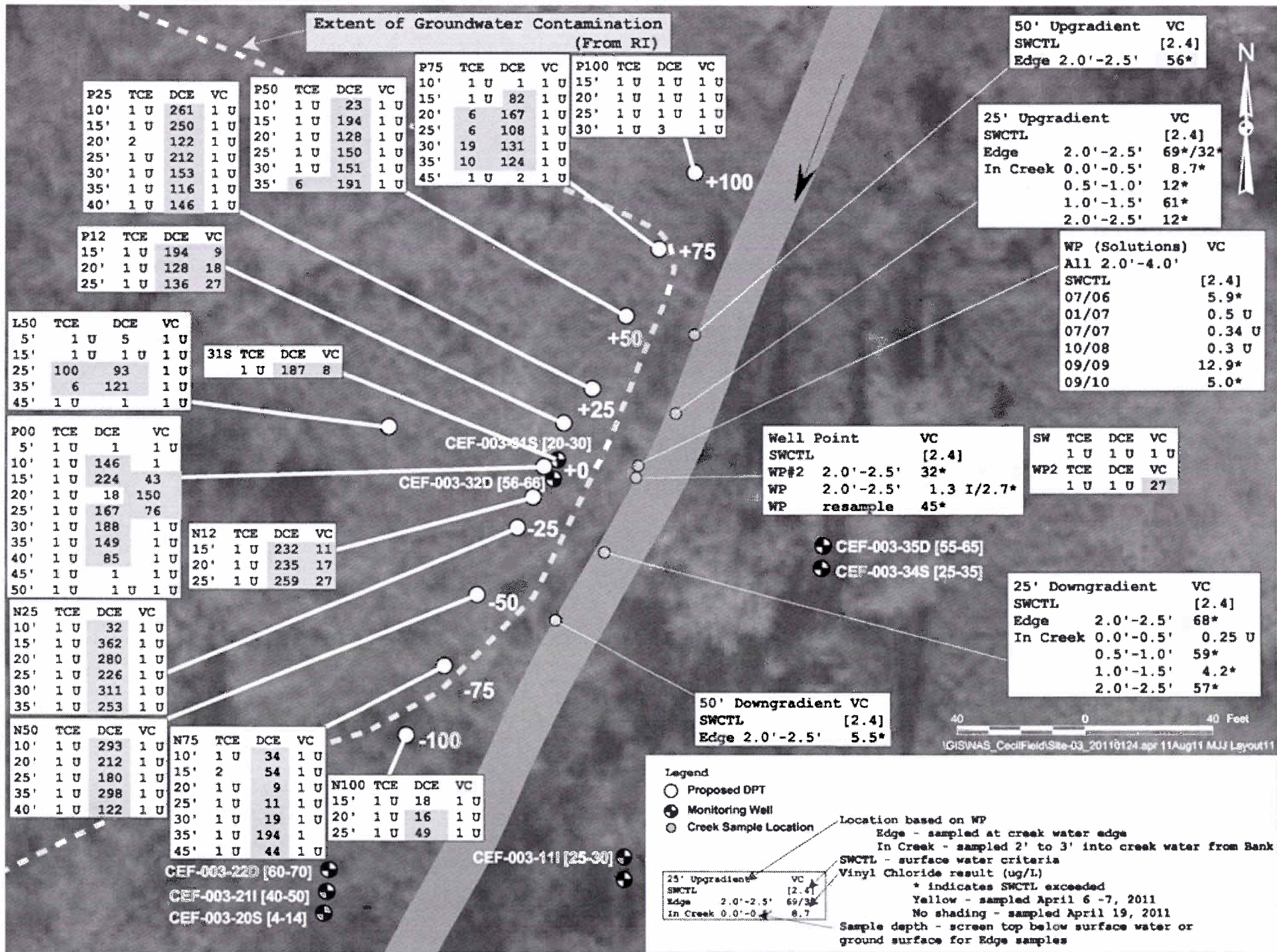


# Field Effort

- Day 1
  - Collected original location (25' in from CEF-003-31S) from 5' to 50' depth (5' increments).
    - VC identified from 15' to 25'.
  - Collected Up 75' and Down 75' locations at 10' to 45' depths.
    - No VC identified.
- Day 2
  - Moved in to Up 50' and Down 25' (where creek WPs had VC hits). Collected 10' to 35' depth.
    - No VC identified. Looked closer at other parameters.
  - Collected Up 100' and Up 25'
    - Selected based on TCE hits at up 75' and to fill in grid.
    - Up 100' all NDs and Up 25' no VC or TCE, but high DCE.
  - Collected MW, WP#2, and a surface water sample.
- Day 3
  - Collected samples at Up 25', Down 50', Up and Down 12.5', and deeper sample at Down 75' to fill in gaps.
  - Collected final samples at 75' in from creek (50' in from original location) at depth of 5' to 45'.







# Analytical Laboratories of Florida: Laboratory Results

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 Client Name: TetraTech, Inc (Pittsburg office)  
 Client Contact: Robert Simcik (412-921-7090)  
 Analysis Methodology: EPA 8021 (subset)

Client Purchase Order Number: 112G02413-CTO 25  
 Laboratory Project Name: TT071211  
 Laboratory Address: 166 Center Street, Suite 111  
 Cape Canaveral, Florida 32920  
 321-258-1355  
 Laboratory Contact: Dale Schamp

Field Chemist: Dale A. Schamp

Signature: *Dale A. Schamp*  
 (Draft Copy unless Signature present.)

Date: 7/20/11  
 NELAC Certification Number: E83934

| Target Compounds                  | Concentration Levels in Parts per Billion (ug/L or ug/Kg) |                    |                        |                |                |
|-----------------------------------|---|--------------------|------------------------|----------------|----------------|
| Field Laboratory Number:          | TT071211-W01  | TT071211-W02       | TT071211-W02 Duplicate | TT071211-W03   | TT071211-W04   |
| Client Field Description:         | CEF-003-POO-05  | CEF-003-POO-15     | CEF-003-POO-15         | CEF-003-POO-25 | CEF-003-POO-35 |
| Matrix:                           | Water   | Water              | Water                  | Water          | Water          |
| Sample Size:                      | 10 ml   | 10 ml              | 10 ml                  | 10 ml          | 10 ml          |
| Sample Collection Date /Received: | 7/12/11 0830  | 7/12/11 0840       | 7/12/11 0840           | 7/12/11 0851   | 7/12/11 0909   |
| Analysis Date:                    | 7/15/2011   | 7/15/2011          | 7/15/2011              | 7/15/2011      | 7/15/2011      |
| Vinyl chloride                    | 1 U   | 43                 | 35                     | 76             | 1 U            |
| 1,1-Dichloroethene                | 1 U   | 54                 | 44                     | 27             | 39             |
| cis-1,2-Dichloroethene            | 1   | 170                | 160                    | 140            | 110            |
| Trichloroethene                   | 1 U   | 1 U                | 1 U                    | 1 U            | 1 U            |
| 1,4-Dichlorobenzene               | 1 U   | 1 U                | 1 U                    | 2              | 1              |
| 1,2-Dichlorobenzene               | 1 U   | 7                  | 7                      | 100            | 64             |
| Naphthalene                       | 2   | 10                 | 10                     | 17             | 23             |
| Field Laboratory Number:          | TT071211-W05  | TT071211-W05 Spike | TT071211-W06           | TT071211-W07   | TT071211-W08   |
| Client Field Description:         | CEF-003-POO-45  | CEF-003-POO-45     | CEF-003-SWPOO          | CEF-003-POO-10 | CEF-003-POO-20 |
| Matrix:                           | Water   | Water & 10 ppb     | Water                  | Water          | Water          |
| Sample Size:                      | 10 ml   | 10 ml              | 10 ml                  | 10 ml          | 10 ml          |
| Sample Collection Date /Received: | 7/12/11 0935  | 7/12/11 0935       | 7/12/11 1005           | 7/12/11 1035   | 7/12/11 1050   |
| Analysis Date:                    | 7/15/2011   | 7/15/2011          | 7/15/2011              | 7/15/2011      | 7/15/2011      |
| Vinyl chloride                    | 1 U   | 9.4 (93.8 % Rec.)  | 1 U                    | 1              | 150            |
| 1,1-Dichloroethene                | 1 U   | 9.2 (91.8 % Rec.)  | 1 U                    | 36             | 1              |
| cis-1,2-Dichloroethene            | 1   | 11 (101.5 % Rec.)  | 1 U                    | 110            | 17             |
| Trichloroethene                   | 1 U   | 11 (110.9 % Rec.)  | 1 U                    | 1 U            | 1 U            |
| 1,4-Dichlorobenzene               | 1 U   | 10 (101.5 % Rec.)  | 1 U                    | 1 U            | 2              |
| 1,2-Dichlorobenzene               | 1   | 11 (94.0 % Rec.)   | 1 U                    | 1 U            | 62             |
| Naphthalene                       | 1   | 11 (96.5 % Rec.)   | 1 U                    | 1 U            | 36             |
| Field Laboratory Number:          | TT071211-W09  | TT071211-W10       | TT071211-W11           | TT071211-W12   | TT071211-W13   |
| Client Field Description:         | CEF-003-POO-30  | CEF-003-POO-40     | CEF-003-POO-50         | CEF-003-P75-15 | CEF-003-P75-25 |
| Matrix:                           | Water   | Water              | Water                  | Water          | Water          |
| Sample Size:                      | 10 ml   | 10 ml              | 10 ml                  | 10 ml          | 10 ml          |
| Sample Collection Date /Received: | 7/12/11 1101  | 7/12/11 1115       | 7/12/11 1140           | 7/12/11 1310   | 7/12/11 1320   |
| Analysis Date:                    | 7/15/2011   | 7/15/2011          | 7/16/2011              | 7/16/2011      | 7/16/2011      |
| Vinyl chloride                    | 1 U   | 1 U                | 1 U                    | 1 U            | 1 U            |
| 1,1-Dichloroethene                | 38  | 24                 | 1 U                    | 24             | 27             |
| cis-1,2-Dichloroethene            | 150   | 58                 | 1 U                    | 58             | 81             |
| Trichloroethene                   | 1 U   | 1 U                | 1 U                    | 1 U            | 6              |
| 1,4-Dichlorobenzene               | 2   | 1 U                | 1 U                    | 1 U            | 1 U            |
| 1,2-Dichlorobenzene               | 120   | 12                 | 1                      | 4              | 3              |
| Naphthalene                       | 25  | 8                  | 3                      | 2              | 1              |

U = Indicates that the compound was analyzed for but not detected at the quantitation limit. The value associated with the qualifier shall be the method detection limit.

J = Estimated value due to sample response greater than calibration curve.

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 Analysis Methodology: EPA 8260 (subset)

Client Purchase Order Number: 112G02413-CTO 25  
 Laboratory Project Name: TT071211  
 Laboratory Address: 166 Center Street, Suite 111  
 Cape Canaveral, Florida 32920  
 321-258-1355  
 Laboratory Contact: Dale Schamp

Field Chemist: Dale A. Schamp

Signature: *Dale A. Schamp*  
 (Draft Copy unless Signature present.)

Date: 7/20/11  
 NELAC Certification Number: E83934

| Target Compounds                  | Concentration Levels in Parts per Billion (ug/L or ug/Kg) |                        |                |                |                    |
|-----------------------------------|---|------------------------|----------------|----------------|--------------------|
| Field Laboratory Number:          | TT071211-W14  | TT071211-W14 Duplicate | TT071211-W15   | TT071211-W16   | TT071211-W16 Spike |
| Client Field Description:         | CEF-003-P75-35  | CEF-003-P75-35         | CEF-003-P75-45 | CEF-003-P75-10 | CEF-003-P75-10     |
| Matrix:                           | Water   | Water                  | Water          | Water          | Water              |
| Sample Size:                      | 10 ml   | 10 ml                  | 10 ml          | 10 ml          | 10 ml              |
| Sample Collection Date /Received: | 7/12/11 1335  | 7/12/11 1335           | 7/12/11 1352   | 7/12/11 1415   | 7/12/11 1415       |
| Analysis Date:                    | 7/16/2011   | 7/16/2011              | 7/16/2011      | 7/16/2011      | 7/16/2011          |
| Vinyl chloride                    | 1 U   | 1 U                    | 1 U            | 1 U            | 11 (107.6 Rec.)    |
| 1,1-Dichloroethene                | 31  | 28                     | 1 U            | 1              | 11 (101.6 % Rec.)  |
| cis-1,2-Dichloroethene            | 93  | 86                     | 2              | 1 U            | 12 (122.4 % Rec.)  |
| Trichloroethene                   | 10  | 10                     | 1 U            | 1 U            | 11 (110.4 % Rec.)  |
| 1,4-Dichlorobenzene               | 1 U   | 1 U                    | 1 U            | 1 U            | 11 (114.6 % Rec.)  |
| 1,2-Dichlorobenzene               | 1 U   | 1 U                    | 1 U            | 1 U            | 11 (108.8 % Rec.)  |
| Naphthalene                       | ■   | 1 U                    | 1 U            | 1 U            | 11 (106.2 % Rec.)  |
| Field Laboratory Number:          | TT071211-W18  | TT071211-W19           | TT071211-W20   | TT071211-W21   | TT071211-W21       |
| Client Field Description:         | CEF-003-P75-20  | CEF-003-P75-30         | CEF-003-N75-15 | CEF-003-N75-25 | CEF-003-N75-35     |
| Matrix:                           | Water   | Water                  | Water          | Water          | Water              |
| Sample Size:                      | 10 ml   | 10 ml                  | 10 ml          | 10 ml          | 10 ml              |
| Sample Collection Date /Received: | 7/12/11 1425  | 7/12/11 1440           | 7/12/11 1535   | 7/12/11 1543   | 7/12/11 1558       |
| Analysis Date:                    | 7/16/2011   | 7/16/2011              | 7/16/2011      | 7/16/2011      | 7/16/2011          |
| Vinyl chloride                    | 1 U   | 1 U                    | 1 U            | 1 U            | 1                  |
| 1,1-Dichloroethene                | 47  | 40                     | 15             | 4              | 34                 |
| cis-1,2-Dichloroethene            | 120   | 91                     | 39             | 7              | 160                |
| Trichloroethene                   | 6   | 19                     | 2              | 1 U            | 1 U                |
| 1,4-Dichlorobenzene               | 1 U   | 1 U                    | 1 U            | 1 U            | 1                  |
| 1,2-Dichlorobenzene               | 17  | 1 U                    | 1 U            | 3              | 76                 |
| Naphthalene                       | 7   | 1 U                    | 1 U            | 1              | 11                 |
| Field Laboratory Number:          | TT071211-W23  | TT071211-W24           | TT071211-W25   | TT071211-W26   | TT071211-W26       |
| Client Field Description:         | CEF-003-N75-10  | CEF-003-N75-20         | CEF-003-N75-30 | CEF-003-P50-15 | CEF-003-P50-25     |
| Matrix:                           | Water   | Water                  | Water          | Water          | Water              |
| Sample Size:                      | 10 ml   | 10 ml                  | 10 ml          | 10 ml          | 10 ml              |
| Sample Collection Date /Received: | 7/12/11 1615  | 7/12/11 1625           | 7/12/2011 1650 | 7/13/2011 0800 | 7/13/2011 0820     |
| Analysis Date:                    | 7/16/2011   | 7/16/2011              | 7/16/2011      | 7/16/2011      | 7/16/2011          |
| Vinyl chloride                    | 1 U   | 1 U                    | 1 U            | 1 U            | 1 U                |
| 1,1-Dichloroethene                | 11  | 4                      | 7              | 64             | 40                 |
| cis-1,2-Dichloroethene            | 23  | 5                      | 12             | 130            | 110                |
| Trichloroethene                   | 1 U   | 1 U                    | 1 U            | 1 U            | 1 U                |
| 1,4-Dichlorobenzene               | 1 U   | 1 U                    | 1 U            | 1 U            | 1 U                |
| 1,2-Dichlorobenzene               | 1 U   | 1 U                    | 4              | 36             | 21                 |
| Naphthalene                       | 1 U   | 1 U                    | 2              | 21             | 6                  |

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J = Estimated value due to sample response greater than calibration curve AND/OR due to sample carryover in order to see 1 ppb D.L. for vinyl chloride regardless of other compounds present.

# Analytical Laboratories of Florida: Laboratory Results

Site Project Name: SITE 3 NAS Cecil Field  
 Site Location: Jacksonville, FL  
 Client Name: TetraTech, Inc (Pittsburg office)  
 Client Contact: Robert Simcik (412-921-7090)  
 Analysis Methodology: EPA 8260 (subset)

Client Purchase Order Number: 112G02413-CTO 25  
 Laboratory Project Name: TT071211  
 Laboratory Address: 166 Center Street, Suite 111  
 Cape Canaveral, Florida 32920  
 321-258-1355  
 Laboratory Contact: Dale Schamp

Field Chemist: Dale A. Schamp

Signature:   
 (Draft Copy unless Signature present.)

Date: 7/20/11  
 NELAC Certification Number: E83934

| Target Compounds                  | Concentration Levels in Parts per Billion (ug/L or ug/Kg) |                        |                |                 |                 |
|-----------------------------------|---|------------------------|----------------|-----------------|-----------------|
| Field Laboratory Number:          | TT071211-W27  | TT071211-W28           | TT071211-W29   | TT071211-W30    | TT071211-W31    |
| Client Field Description:         | CEF-003-P50-35  | CEF-003-P50-10         | CEF-003-P50-20 | CEF-003-WP02    | CEF-003-P50-30  |
| Matrix:                           | Water   | Water                  | Water          | Water           | Water           |
| Sample Size:                      | 10 ml   | 10 ml                  | 10 ml          | 10 ml           | 10 ml           |
| Sample Collection Date /Received: | 7/13/2011 0835  | 7/13/2011 0840         | 7/13/2011 0905 | 7/13/2011 0915  | 7/13/2011 0925  |
| Analysis Date:                    | 7/16/2011   | 7/16/2011              | 7/16/2011      | 7/16/2011       | 7/16/2011       |
| Vinyl chloride                    | 1 U   | 1 U                    | 1 U            | 27              | 1 U             |
| 1,1-Dichloroethene                | 51  | 8                      | 45             | 1 U             | 31              |
| cis-1,2-Dichloroethene            | 140   | 15                     | 83             | 1 U             | 120             |
| Trichloroethene                   | 6   | 1 U                    | 1 U            | 1 U             | 1 U             |
| 1,4-Dichlorobenzene               | 1 U   | 1 U                    | 1              | 1 U             | 1 U             |
| 1,2-Dichlorobenzene               | 1 U   | 1 U                    | 54             | 10              | 13              |
| Naphthalene                       | 1 U   | 1 U                    | 36             | 2               | 2               |
| Field Laboratory Number:          | TT071211-W32  | TT071211-W32 Duplicate | TT071211-W33   | TT071211-W34    | TT071211-W35    |
| Client Field Description:         | CEF-003-31S   | CEF-003-31S            | CEF-003-N25-25 | CEF-003-N25-35  | CEF-003-N25-10  |
| Matrix:                           | Water   | Water                  | Water          | Water           | Water           |
| Sample Size:                      | 10 ml   | 10 ml                  | 10 ml          | 10 ml           | 10 ml           |
| Sample Collection Date /Received: | 7/13/2011 0950  | 7/13/2011 0950         | 7/13/2011 1035 | 7/13/2011 1055  | 7/13/2011 1115  |
| Analysis Date:                    | 7/16/2011   | 7/16/2011              | 7/16/2011      | 7/16/2011       | 7/16/2011       |
| Vinyl chloride                    | 8   | 7                      | 1 U            | 1 U             | 1 U             |
| 1,1-Dichloroethene                | 47  | 41                     | 56             | 63              | 9               |
| cis-1,2-Dichloroethene            | 140   | 130                    | 170            | 190             | 23              |
| Trichloroethene                   | 1 U   | 1 U                    | 1 U            | 1 U             | 1 U             |
| 1,4-Dichlorobenzene               | 1 U   | 1 U                    | 1              | 3               | 1 U             |
| 1,2-Dichlorobenzene               | 48  | 46                     | 73             | 160             | 1               |
| Naphthalene                       | 7   | 8                      | 8              | 41              | 1               |
| Field Laboratory Number:          | TT071211-W36  | TT071211-W37           | TT071211-W38   | TT071211-W39    | TT071211-W40    |
| Client Field Description:         | CEF-003-N25-20  | CEF-003-N25-30         | CEF-003-N25-15 | CEF-003-N100-15 | CEF-003-N100-25 |
| Matrix:                           | Water   | Water                  | Water          | Water           | Water           |
| Sample Size:                      | 10 ml   | 10 ml                  | 10 ml          | 10 ml           | 10 ml           |
| Sample Collection Date /Received: | 7/13/2011 1130  | 7/13/2011 1150         | 7/13/2011 1020 | 7/13/11 1300    | 7/13/11 1315    |
| Analysis Date:                    | 7/16/2011   | 7/16/2011              | 7/16/2011      | 7/16/2011       | 7/16/2011       |
| Vinyl chloride                    | 1 U   | 1 U                    | 1 U            | 1 U             | 1 U             |
| 1,1-Dichloroethene                | 60  | 71                     | 92             | 3               | 16              |
| cis-1,2-Dichloroethene            | 220   | 240                    | 270            | 15              | 33              |
| Trichloroethene                   | 1 U   | 1 U                    | 1 U            | 1 U             | 1 U             |
| 1,4-Dichlorobenzene               | 1   | 2                      | 1 U            | 1 U             | 1 U             |
| 1,2-Dichlorobenzene               | 71  | 100                    | 20             | 2               | 9               |
| Naphthalene                       | 8   | 11                     | 2              | 1 U             | 5               |

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 Laboratory Contact: Dale Schamp

Field Chemist: Dale A. Schamp

Signature:   
 (Draft Copy unless Signature present.)

Date: 7/20/11  
 NELAC Certification Number: E83934

| Target Compounds                  | Concentration Levels in Parts per Billion (ug/L or ug/Kg) |                 |                 |                 |                    |
|-----------------------------------|---|-----------------|-----------------|-----------------|--------------------|
| Field Laboratory Number:          | TT071211-W41  | TT071211-W42    | TT071211-W43    | TT071211-W44    | TT071211-W44 Spike |
| Client Field Description:         | CEF-003-N100-20   | CEF-003-P100-15 | CEF-003-P100-25 | CEF-003-P100-20 | CEF-003-P100-20    |
| Matrix:                           | Water   | Water           | Water           | Water           | Water & 10 ppb     |
| Sample Size:                      | 10 ml   | 10 ml           | 10 ml           | 10 ml           | 10 ml              |
| Sample Collection Date /Received: | 7/13/11 1330  | 7/13/11 1425    | 7/13/11 1440    | 7/13/11 1500    | 7/13/11 1500       |
| Analysis Date:                    | 7/16/2011   | 7/16/2011       | 7/16/2011       | 7/16/2011       | 7/16/2011          |
| Vinyl chloride                    | 1 U   | 1 U             | 1 U             | 1 U             | 10 (95.7 % Rec.)   |
| 1,1-Dichloroethene                | 8   | 1 U             | 1 U             | 1 U             | 9 (91.9 % Rec.)    |
| cis-1,2-Dichloroethene            | 8   | 1 U             | 1 U             | 1 U             | 11 (105.9 % Rec.)  |
| Trichloroethene                   | 1 U   | 1 U             | 1 U             | 1 U             | 10 (97.0 % Rec.)   |
| 1,4-Dichlorobenzene               | 1 U   | 1 U             | 1 U             | 1 U             | 10 (102.6 % Rec.)  |
| 1,2-Dichlorobenzene               | 2   | 1 U             | 1 U             | 1 U             | 10 (97.0 % Rec.)   |
| Naphthalene                       | 3   | 1 U             | 1 U             | 1 U             | 10 (95.7 % Rec.)   |
| Field Laboratory Number:          | TT071211-W45  | TT071211-W46    | TT071211-W47    | TT071211-W48    | TT071211-W49       |
| Client Field Description:         | CEF-003-P100-30   | CEF-003-P25-15  | CEF-003-P25-25  | CEF-003-P25-10  | CEF-003-P25-20     |
| Matrix:                           | Water   | Water           | Water           | Water           | Water              |
| Sample Size:                      | 10 ml   | 10 ml           | 10 ml           | 10 ml           | 10 ml              |
| Sample Collection Date /Received: | 7/13/11 1515  | 7/13/11 1545    | 7/13/11 1600    | 7/13/11 1615    | 7/13/11 1625       |
| Analysis Date:                    | 7/16/2011   | 7/16/2011       | 7/16/2011       | 7/16/2011       | 7/16/2011          |
| Vinyl chloride                    | 1 U   | 1 U             | 1 U             | 1 U             | 1 U                |
| 1,1-Dichloroethene                | 2   | 70              | 52              | 5               | 44                 |
| cis-1,2-Dichloroethene            | 1   | 180             | 160             | 13              | 78                 |
| Trichloroethene                   | 1 U   | 1 U             | 1 U             | 1 U             | 2                  |
| 1,4-Dichlorobenzene               | 1 U   | 1 U             | 2               | 1 U             | 2                  |
| 1,2-Dichlorobenzene               | 1 U   | 25              | 100             | 1               | 85                 |
| Field Laboratory Number:          | TT071211-W50  | TT071211-W51    | TT071211-W52    | TT071211-W53    | TT071211-W54       |
| Client Field Description:         | CEF-003-P25-30  | CEF-003-P25R-20 | CEF-003-P25R-30 | CEF-003-P25R-40 | CEF-003-P25R-40    |
| Matrix:                           | Water   | Water           | Water           | Water           | Water              |
| Sample Size:                      | 10 ml   | 10 ml           | 10 ml           | 10 ml           | 10 ml              |
| Sample Collection Date /Received: | 7/13/11 1645  | 7/14/11 0808    | 7/14/11 0824    | 7/14/11 0840    | 7/14/11 0840       |
| Analysis Date:                    | 7/16/2011   | 7/16/2011       | 7/17/2011       | 7/17/2011       | 7/17/2011          |
| Vinyl chloride                    | 1   | 1 U             | 1 U             | 1 U             | 1 U                |
| 1,1-Dichloroethene                | 33  | 38              | 41              | 36              | 32                 |
| cis-1,2-Dichloroethene            | 120   | 69              | 110             | 110             | 99                 |
| Trichloroethene                   | 1 U   | 2               | 1 U             | 1 U             | 1 U                |
| 1,4-Dichlorobenzene               | 1   | 2               | 1 U             | 1 U             | 1 U                |
| 1,2-Dichlorobenzene               | 65  | 69              | 46              | 3               | 3                  |
| Naphthalene                       | 15  | 56              | 13              | 2               | 1                  |

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 Laboratory Contact: Dale Schamp

Field Chemist: Dale A. Schamp

Signature:   
 (Draft Copy unless Signature present.)

Date: 7/20/11  
 NELAC Certification Number: E83934

| Target Compounds                  | Concentration Levels in Parts per Billion (ug/L or ug/Kg) |                 |                 |                |                |
|-----------------------------------|---|-----------------|-----------------|----------------|----------------|
| Field Laboratory Number:          | TT071211-W54  | TT071211-W55    | TT071211-W56    | TT071211-W57   | TT071211-W58   |
| Client Field Description:         | CEF-003-P25R-15   | CEF-003-P25R-25 | CEF-003-P25R-35 | CEF-003-N50-10 | CEF-003-N50-20 |
| Matrix:                           | Water   | Water           | Water           | Water          | Water          |
| Sample Size:                      | 10 ml   | 10 ml           | 10 ml           | 10 ml          | 10 ml          |
| Sample Collection Date /Received: | 7/14/11 0850  | 7/14/11 0900    | 7/14/11 0915    | 7/14/11 0952   | 7/14/11 0958   |
| Analysis Date:                    | 7/17/2011   | 7/17/2011       | 7/17/2011       | 7/17/2011      | 7/17/2011      |
| Vinyl chloride                    | 1 U   | 1 U             | 1 U             | 1 U            | 1 U            |
| 1,1-Dichloroethene                | 71  | 48              | 39              | 83             | 42             |
| cis-1,2-Dichloroethene            | 190   | 140             | 77              | 210            | 170            |
| Trichloroethene                   | 1 U   | 1 U             | 1 U             | 1 U            | 1 U            |
| 1,4-Dichlorobenzene               | 1 U   | 2               | 1 U             | 1 U            | 1 U            |
| 1,2-Dichlorobenzene               | 40  | 83              | 47              | 1              | 41             |
| Naphthalene                       | 22  | 20              | 29              | 2              | 8              |
| Field Laboratory Number:          | TT071211-W59  | TT071211-W60    | TT071211-W61    | TT071211-W62   | TT071211-W63   |
| Client Field Description:         | CEF-003-N50-40  | CEF-003-N50-25  | CEF-003-N50-35  | CEF-003-N75-45 | CEF-003-P12-15 |
| Matrix:                           | Water   | Water           | Water           | Water          | Water          |
| Sample Size:                      | 10 ml   | 10 ml           | 10 ml           | 10 ml          | 10 ml          |
| Sample Collection Date /Received: | 7/14/11 1010  | 7/14/11 1025    | 7/14/11 1040    | 7/14/11 1105   | 7/14/11 1220   |
| Analysis Date:                    | 7/17/2011   | 7/17/2011       | 7/17/2011       | 7/17/2011      | 7/17/2011      |
| Vinyl chloride                    | 1 U   | 1 U             | 1 U             | 1 U            | 9              |
| 1,1-Dichloroethene                | 40  | 40              | 78              | 12             | 54             |
| cis-1,2-Dichloroethene            | 82  | 140             | 220             | 32             | 140            |
| Trichloroethene                   | 1 U   | 1 U             | 1 U             | 1 U            | 1 U            |
| 1,4-Dichlorobenzene               | 1 U   | 1 U             | 3               | 10 U           | 10 U           |
| 1,2-Dichlorobenzene               | 36  | 48              | 130             | 16             | 4              |
| Naphthalene                       | 28  | 6               | 16              | 5              | 3              |
| Field Laboratory Number:          | TT071211-W64  | TT071211-W65    | TT071211-W66    | TT071211-W67   | TT071211-W68   |
| Client Field Description:         | CEF-003-P12-25  | CEF-003-P12-20  | CEF-003-N12-15  | CEF-003-N12-25 | CEF-003-N12-20 |
| Matrix:                           | Water   | Water           | Water           | Water          | Water          |
| Sample Size:                      | 10 ml   | 10 ml           | 10 ml           | 10 ml          | 10 ml          |
| Sample Collection Date /Received: | 7/14/11 1228  | 7/14/11 1235    | 7/14/11 1250    | 7/14/11 1300   | 7/14/11 1305   |
| Analysis Date:                    | 7/17/2011   | 7/17/2011       | 7/17/2011       | 7/17/2011      | 7/17/2011      |
| Vinyl chloride                    | 27  | 18              | 11              | 24             | 17             |
| 1,1-Dichloroethene                | 36  | 37              | 52              | 49             | 45             |
| cis-1,2-Dichloroethene            | 100   | 91              | 180             | 210            | 190            |
| Trichloroethene                   | 1 U   | 1 U             | 1 U             | 1 U            | 1 U            |
| 1,4-Dichlorobenzene               | 3   | 2               | 1 U             | 2              | 3              |
| 1,2-Dichlorobenzene               | 120   | 15              | 35              | 110            | 130            |
| Naphthalene                       | 37  | 49              | 18              | 16             | 26             |

U = Indicates that the compound was analyzed for but not detected at the quantitation limit. The value associated with the qualifier shall be the method detection limit.

J = Estimated value due to sample response greater than calibration curve AND/OR due to sample carryover in order to see 1 ppb D.L. for vinyl chloride regardless of other compounds present.

## Analytical Laboratories of Florida: Laboratory Results

Site Project Name: SITE 3 NAS Cecil Field  
 Site Location: Jacksonville, FL  
 Client Name: TetraTech, Inc (Pittsburg office)  
 Client Contact: Robert Simcik (412-921-7090)  
 Analysis Methodology: EPA 8260 (subset)

Client Purchase Order Number: 112G02413-CTO 25  
 Laboratory Project Name: TT071211  
 Laboratory Address: 166 Center Street, Suite 111  
 Cape Canaveral, Florida 32920  
 321-258-1355  
 Laboratory Contact: Dale Schamp

Field Chemist: Dale A. Schamp

Signature: *Dale A. Schamp*  
 (Draft Copy unless Signature present.)

Date: 7/20/11  
 NELAC Certification Number: E83934

| Target Compounds                  | Concentration Levels in Parts per Billion (ug/L or ug/Kg) |                    |                        |                    |                |
|-----------------------------------|---|--------------------|------------------------|--------------------|----------------|
| Field Laboratory Number:          | TT071211-W69  |                    | TT071211-W70 Spike     |                    |                |
| Client Field Description:         | CEF-003-L50-05  | CEF-003-L50-15     | CEF-003-L50-15         | CEF-003-L50-25     | CEF-003-L50-35 |
| Matrix:                           | Water   | Water              | Water & 10 ppb         | Water              | Water          |
| Sample Size:                      | 10 ml   | 10 ml              | 10 ml                  | 10 ml              | 10 ml          |
| Sample Collection Date /Received: | 7/14/11 1348  | 7/14/11 1407       | 7/14/11 1407           | 7/14/11 1418       | 7/14/11 1432   |
| Analysis Date:                    | 7/17/2011   | 7/17/2011          | 7/17/2011              | 7/17/2011          | 7/17/2011      |
| Vinyl chloride                    | 1 U   | 1 U                | 9 (90.6 % Rec.)        | 1 U                | 1 U            |
| 1,1-Dichloroethene                | 1 U   | 1 U                | 9 (91.7 % Rec.)        | 48                 | 49             |
| cis-1,2-Dichloroethene            | 5   | 1 U                | 12 (116.5 % Rec.)      | 45                 | 72             |
| Trichloroethene                   | 1 U   | 1 U                | 10 (100.6 % Rec.)      | 100                | 6              |
| 1,4-Dichlorobenzene               | 1 U   | 1 U                | 10 (101.9 % Rec.)      | 1                  | 2              |
| 1,2-Dichlorobenzene               | 8   | 1 U                | 10 (102.4 % Rec.)      | 100                | 75             |
| Naphthalene                       | 2   | 1 U                | 11 (110.7 % Rec.)      | 37                 | 68             |
| Field Laboratory Number:          | TT071211-W73  | TT071211-W74       | TT071211-W74 Duplicate | TT071211-W75       | N/A            |
| Client Field Description:         | CEF-003-L50-45  | CEF-003-DWN25-2025 | CEF-003-DWN25-2025     | CEF-003-DWN25-0510 | N/A            |
| Matrix:                           | Water   | Water              | Water                  | Water              | N/A            |
| Sample Size:                      | 10 ml   | 10 ml              | 10 ml                  | 10 ml              | N/A            |
| Sample Collection Date /Received: | 7/14/11 1452  | 7/14/11 1540       | 7/14/11 1540           | 7/14/11 1600       | N/A            |
| Analysis Date:                    | 7/17/2011   | 7/17/2011          | 7/17/2011              | 7/17/2011          | N/A            |
| Vinyl chloride                    | 1 U   | 74                 | 66                     | 52                 | N/A            |
| 1,1-Dichloroethene                | 1 U   | 1 U                | 1 U                    | 1 U                | N/A            |
| cis-1,2-Dichloroethene            | 1   | 2                  | 2                      | 1 U                | N/A            |
| Trichloroethene                   | 1 U   | 1 U                | 1 U                    | 1 U                | N/A            |
| 1,4-Dichlorobenzene               | 1 U   | 1 U                | 1 U                    | 1 U                | N/A            |
| 1,2-Dichlorobenzene               | 4   | 5                  | 5                      | 4                  | N/A            |
|                                   |   |                    |                        |                    |                |
| Client Field Description:         | N/A   | N/A                | N/A                    | N/A                | N/A            |
| Matrix:                           | N/A   | N/A                | N/A                    | N/A                | N/A            |
| Sample Size:                      | N/A   | N/A                | N/A                    | N/A                | N/A            |
| Sample Collection Date /Received: | N/A   | N/A                | N/A                    | N/A                | N/A            |
| Analysis Date:                    | N/A   | N/A                | N/A                    | N/A                | N/A            |
| Vinyl chloride                    | N/A   | N/A                | N/A                    | N/A                | N/A            |
| 1,1-Dichloroethene                | N/A   | N/A                | N/A                    | N/A                | N/A            |
| cis-1,2-Dichloroethene            | N/A   | N/A                | N/A                    | N/A                | N/A            |
| Trichloroethene                   | N/A   | N/A                | N/A                    | N/A                | N/A            |
| 1,4-Dichlorobenzene               | N/A   | N/A                | N/A                    | N/A                | N/A            |
| 1,2-Dichlorobenzene               | N/A   | N/A                | N/A                    | N/A                | N/A            |
| Naphthalene                       | N/A   | N/A                | N/A                    | N/A                | N/A            |

U = Indicates that the compound was analyzed for but not detected at the quantitation limit. The value associated with the qualifier shall be the method detection limit.

J = Estimated value due to sample response greater than calibration curve AND/OR due to sample carryover in order to see 1 ppb D.L. for vinyl chloride regardless of other compounds present.

| Up Creek (Positive) 100 feet |     |             |         |     |       |           |         |           |        |      |        |           | Up Creek (Positive) 75 feet |     |             |         |     |       |           |         |           |        |      |      |           |
|------------------------------|-----|-------------|---------|-----|-------|-----------|---------|-----------|--------|------|--------|-----------|-----------------------------|-----|-------------|---------|-----|-------|-----------|---------|-----------|--------|------|------|-----------|
| LocID                        | TCE | cis-1,2-DCE | 1,1-DCE | VC  | Napth | 1,4 - DCB | 1,2-DCB | DO (mg/L) | ORP    | pH   | Cond   | Temp (°C) | LocID                       | TCE | cis-1,2-DCE | 1,1-DCE | VC  | Napth | 1,4 - DCB | 1,2-DCB | DO (mg/L) | ORP    | pH   | Cond | Temp (°C) |
|                              |     |             |         |     |       |           |         |           |        |      |        |           | CEF-003-P75-10              | 1 U | 1 U         | 1       | 1 U | 1 U   | 1 U       | 1 U     | 1.87      | -24.3  | 6.8  | 308  | 24.87     |
| CEF-003-P100-15              | 1 U | 1 U         | 1 U     | 1 U | 1 U   | 1 U       | 1 U     | 0.85      | -62.2  | 6.76 | 264    | 26.85     | CEF-003-P75-15              | 1 U | 58          | 24      | 1 U | 2     | 1 U       | 4       | 0.39      | -94.7  | 7.19 | 313  | 27.96     |
| CEF-003-P100-20              | 1 U | 1 U         | 1 U     | 1 U | 1 U   | 1 U       | 1 U     | 0.11      | 446    | 7.57 | -157.8 | 27.55     | CEF-003-P75-20              | 6   | 120         | 47      | 1 U | 7     | 1 U       | 17      | 1.07      | -32.4  | 6.68 | 273  | 25.77     |
| CEF-003-P100-25              | 1 U | 1 U         | 1 U     | 1 U | 1 U   | 1 U       | 1 U     | 0.24      | -133.8 | 7.43 | 429    | 27.5      | CEF-003-P75-25              | 6   | 81          | 27      | 1 U | 1     | 1 U       | 3       | 0.59      | -57.2  | 6.98 | 320  | 25.7      |
| CEF-003-P100-30              | 1 U | 1           | 2       | 1 U | 1 U   | 1 U       | 1 U     | 0.27      | -156.3 | 7.35 | 432    | 28.3      | CEF-003-P75-30              | 19  | 91          | 40      | 1 U | 1 U   | 1 U       | 1 U     | 0.6       | -52.3  | 7.15 | 393  | 27.62     |
|                              |     |             |         |     |       |           |         |           |        |      |        |           | CEF-003-P75-35              | 10  | 93          | 31      | 1 U | 1 U   | 1 U       | 1 U     | 1.44      | -48.7  | 7.35 | 404  | 27.98     |
|                              |     |             |         |     |       |           |         |           |        |      |        |           |                             |     |             |         |     |       |           |         |           |        |      |      |           |
|                              |     |             |         |     |       |           |         |           |        |      |        |           | CEF-003-P75-45              | 1 U | 2           | 1 U     | 1 U | 1 U   | 1 U       | 1 U     | 0.66      | -117.9 | 7.74 | 492  | 28.21     |
|                              |     |             |         |     |       |           |         |           |        |      |        |           |                             |     |             |         |     |       |           |         |           |        |      |      |           |
|                              |     |             |         |     |       |           |         |           |        |      |        |           |                             |     |             |         |     |       |           |         |           |        |      |      |           |
|                              |     |             |         |     |       |           |         |           |        |      |        |           |                             |     |             |         |     |       |           |         |           |        |      |      |           |
|                              |     |             |         |     |       |           |         |           |        |      |        |           |                             |     |             |         |     |       |           |         |           |        |      |      |           |

**Bold** - Detected Values  
Yellow Highlight - Value exceeds GCTL  
Blue Highlight - Value exceeds SW Criteria  
Orange Highlight - exceeds both SW and GCTL  
Red Highlight - exceeds NADC

| Criteria    | GCTL (ug/L) | SW (ug/L) | NADC (ug/L) |
|-------------|-------------|-----------|-------------|
| TCE         | 3           | 80.7      | 300         |
| cis-1,2-DCE | 70          | NA        | 700         |
| 1,1-DCE     | 7           | 3.2       | 70          |
| VC          | 1           | 2.4       | 100         |
| Napth       | 14          | 26        | 140         |
| 1,4- DCB    | 75          | 3         | 7,500       |
| 1,2- DCB    | 600         | 99        | 6,000       |

[illegible]



[illegible]

| Original Location |     |             |         |     |       |           |         |           |        |      |      |           | Down Creek (Negative) 12 feet |     |             |         |    |       |           |         |           |       |      |      |           |
|-------------------|-----|-------------|---------|-----|-------|-----------|---------|-----------|--------|------|------|-----------|-------------------------------|-----|-------------|---------|----|-------|-----------|---------|-----------|-------|------|------|-----------|
| LocID             | TCE | cis-1,2-DCE | 1,1-DCE | VC  | Napth | 1,4 - DCB | 1,2-DCB | DO (mg/L) | ORP    | pH   | Cond | Temp (°C) | LocID                         | TCE | cis-1,2-DCE | 1,1-DCE | VC | Napth | 1,4 - DCB | 1,2-DCB | DO (mg/L) | ORP   | pH   | Cond | Temp (°C) |
| CEF-003-POO-05    | 1 U | 1           | 1 U     | 1 U | 2     | 1 U       | 1 U     | 8.99      | 1.7    | 5.92 | 223  | 26.19     |                               |     |             |         |    |       |           |         |           |       |      |      |           |
| CEF-003-POO-10    | 1 U | 110         | 36      | 1   | 1 U   | 1 U       | 1 U     | 1.26      | 14.9   | 5.86 | 167  | 25        |                               |     |             |         |    |       |           |         |           |       |      |      |           |
| CEF-003-POO-15    | 1 U | 170         | 54      | 43  | 10    | 1 U       | 7       | 0.33      | 16.1   | 5.8  | 197  | 23.87     | CEF-003-N12-15                | 1 U | 180         | 52      | 11 | 18    | 1 U       | 35      | 0.55      | 174.6 | 3.48 | 226  | 29.15     |
| CEF-003-POO-20    | 1 U | 17          | 1       | 150 | 36    | 2         | 62      | 0.72      | 7.8    | 6.14 | 202  | 25.62     | CEF-003-N12-20                | 1 U | 190         | 45      | 17 | 26    | 3         | 130     | 0.29      | 160.5 | 4.17 | 272  | 28.32     |
| CEF-003-POO-25    | 1 U | 140         | 27      | 76  | 17    | 2         | 100     | 0.27      | -10.9  | 6.29 | 237  | 23.9      | CEF-003-N12-25                | 1 U | 210         | 49      | 27 | 16    | 2         | 110     | 0.39      | 155.5 | 4.04 | 278  | 28.23     |
| CEF-003-POO-30    | 1 U | 150         | 38      | 1 U | 25    | 2         | 120     | 0.33      | 2.4    | 6.39 | 203  | 26.14     |                               |     |             |         |    |       |           |         |           |       |      |      |           |
| CEF-003-POO-35    | 1 U | 110         | 39      | 1 U | 23    | 1         | 64      | 0.25      | 14.1   | 5.9  | 203  | 24.59     |                               |     |             |         |    |       |           |         |           |       |      |      |           |
| CEF-003-POO-40    | 1 U | 58          | 24      | 1 U | 8     | 1 U       | 12      | 0.88      | -43.9  | 6.89 | 381  | 27.88     |                               |     |             |         |    |       |           |         |           |       |      |      |           |
| CEF-003-POO-45    | 1 U | 1           | 1 U     | 1 U | 1     | 1 U       | 1       | 0.33      | -206.8 | 7.3  | 520  | 26.65     |                               |     |             |         |    |       |           |         |           |       |      |      |           |
| CEF-003-POO-50    | 1 U | 1 U         | 1 U     | 1 U | 3     | 1 U       | 1       | 0.62      | -177.6 | 7.51 | 538  | 27.6      |                               |     |             |         |    |       |           |         |           |       |      |      |           |
|                   |     |             |         |     |       |           |         |           |        |      |      |           |                               |     |             |         |    |       |           |         |           |       |      |      |           |
|                   |     |             |         |     |       |           |         |           |        |      |      |           |                               |     |             |         |    |       |           |         |           |       |      |      |           |
|                   |     |             |         |     |       |           |         |           |        |      |      |           |                               |     |             |         |    |       |           |         |           |       |      |      |           |

| LocID          | TCE | cis-1,2-DCE | 1,1-DCE | VC  | Napth | 1,4 - DCB | 1,2-DCB | DO (mg/L) | ORP   | pH   | Cond | Temp (°C) |
|----------------|-----|-------------|---------|-----|-------|-----------|---------|-----------|-------|------|------|-----------|
| CEF-003-SW-POO | 1 U | 1 U         | 1 U     | 1 U | 1 U   | 1 U       | 1 U     | ---       | ---   | ---  | ---  | ---       |
|                |     |             |         |     |       |           |         |           |       |      |      |           |
| CEF-003-WP02   | 1 U | 1 U         | 1 U     | 27  | 2     | 1 U       | 10      | 5.86      | -61.8 | 6.95 | 250  | 24.57     |
|                |     |             |         |     |       |           |         |           |       |      |      |           |
| CEF-003-31S    | 1 U | 140         | 47      | 8   | 7     | 1 U       | 48      | 0.39      | -62.4 | 6.55 | 243  | 22.74     |
|                |     |             |         |     |       |           |         |           |       |      |      |           |
| CEF-003-L50-05 | 1 U | 5           | 1 U     | 1 U | 2     | 1 U       | 8       | 2.4       | 49.5  | 7.28 | 233  | 28.25     |
|                |     |             |         |     |       |           |         |           |       |      |      |           |
| CEF-003-L50-15 | 1 U | 1 U         | 1 U     | 1 U | 1 U   | 1 U       | 1 U     | 0.15      | 49.9  | 6.7  | 203  | 28.72     |
| CEF-003-L50-25 | 100 | 45          | 48      | 1 U | 37    | 1         | 100     | 0.39      | 120.7 | 5.7  | 229  | 32.33     |
| CEF-003-L50-35 | 6   | 72          | 49      | 1 U | 68    | 2         | 75      | 0.41      | 111.2 | 5.68 | 168  | 27.83     |
| CEF-003-L50-45 | 1 U | 1           | 1 U     | 1 U | 8     | 1 U       | 4       | 0.17      | 170.4 | 5.26 | 446  | 28.38     |

| Down Creek (Negative) 25 feet |     |             |         |     |        |           |         |           |       |      |      |           | Down Creek (Negative) 50 feet |     |             |         |     |        |           |         |           |      |      |      |           |
|-------------------------------|-----|-------------|---------|-----|--------|-----------|---------|-----------|-------|------|------|-----------|-------------------------------|-----|-------------|---------|-----|--------|-----------|---------|-----------|------|------|------|-----------|
| LocID                         | TCE | cis-1,2-DCE | 1,1-DCE | VC  | Naphth | 1,4 - DCB | 1,2-DCB | DO (mg/L) | ORP   | pH   | Cond | Temp (°C) | LocID                         | TCE | cis-1,2-DCE | 1,1-DCE | VC  | Naphth | 1,4 - DCB | 1,2-DCB | DO (mg/L) | ORP  | pH   | Cond | Temp (°C) |
| CEF-003-N25-10                | 1 U | 23          | 9       | 1 U | 1      | 1 U       | 1       | 0.14      | -50.4 | 6.56 | 205  | 27.81     | CEF-003-N50-10                | 1 U | 210         | 83      | 1 U | 2      | 1 U       | 1       | 0.32      | 70.1 | 6.96 | 268  | 25.84     |
| CEF-003-N25-15                | 1 U | 270         | 92      | 1 U | 2      | 1 U       | 20      | 0.45      | -46.2 | 6.51 | 219  | 28.76     |                               |     |             |         |     |        |           |         |           |      |      |      |           |
| CEF-003-N25-20                | 1 U | 220         | 60      | 1 U | 8      | 1         | 71      | 0.43      | -43.9 | 5.68 | 284  | 28.87     | CEF-003-N50-20                | 1 U | 170         | 42      | 1 U | 8      | 1 U       | 41      | 0.3       | 73.4 | 6.14 | 298  | 24.97     |
| CEF-003-N25-25                | 1 U | 170         | 56      | 1 U | 8      | 1         | 73      | 0.15      | -63.2 | 6.64 | 283  | 31.71     | CEF-003-N50-25                | 1 U | 140         | 40      | 1 U | 6      | 1 U       | 48      | 0.27      | 58   | 6.67 | 291  | 25.11     |
| CEF-003-N25-30                | 1 U | 240         | 71      | 1 U | 11     | 2         | 100     | 0.38      | -42.4 | 6.44 | 242  | 29.59     |                               |     |             |         |     |        |           |         |           |      |      |      |           |
| CEF-003-N25-35                | 1 U | 190         | 63      | 1 U | 41     | 3         | 160     | 0.42      | -43.1 | 6.13 | 158  | 28.21     | CEF-003-N50-35                | 1 U | 220         | 78      | 1 U | 16     | 3         | 130     | 0.15      | 21.8 | 6.55 | 212  | 25.95     |
|                               |     |             |         |     |        |           |         |           |       |      |      |           | CEF-003-N50-40                | 1 U | 82          | 40      | 1 U | 28     | 1 U       | 36      | 0.13      | 84.9 | 5.33 | 204  | 25.48     |
|                               |     |             |         |     |        |           |         |           |       |      |      |           |                               |     |             |         |     |        |           |         |           |      |      |      |           |
|                               |     |             |         |     |        |           |         |           |       |      |      |           |                               |     |             |         |     |        |           |         |           |      |      |      |           |
|                               |     |             |         |     |        |           |         |           |       |      |      |           |                               |     |             |         |     |        |           |         |           |      |      |      |           |
|                               |     |             |         |     |        |           |         |           |       |      |      |           |                               |     |             |         |     |        |           |         |           |      |      |      |           |
|                               |     |             |         |     |        |           |         |           |       |      |      |           |                               |     |             |         |     |        |           |         |           |      |      |      |           |

| LocID              | TCE | cis-1,2-DCE | 1,1-DCE | VC | Naphth | 1,4 - DCB | 1,2-DCB | DO (mg/L) | ORP   | pH   | Cond | Temp (°C) |
|--------------------|-----|-------------|---------|----|--------|-----------|---------|-----------|-------|------|------|-----------|
| CEF-003-DWN25-2025 | 1 U | 2           | 1 U     | 74 | 1 U    | 1 U       | 5       | 0.31      | 131.5 | 5.66 | 338  | 25.64     |
| - PZ Wells -       |     |             |         |    |        |           |         |           |       |      |      |           |
| CEF-003-DWN25-0510 | 1 U | 1 U         | 1 U     | 52 | 1 U    | 1 U       | 4       | 2.51      | 98.5  | 7.4  | 351  | 28.96     |

[illegible]

PERSONNEL: R. SIMCIK, K. WEICHERT (TENUS)

TRUCK: 2001 F-250, RENTAL

PPE: LEVEL "D"

WEATHER: HOT, HUMID, 90°, SUNNY, SCATTERED CLOUDS

OBJECTIVE: BEGIN DPT GW SAMPLING AT SITE 3

0540 KW AT TENUS OFFICE LOADING EQUIPMENT FOR TODAY'S WORK  
0605 KW DEPARTS TENUS OFFICE FOR NAS CECIL FIELD - WILL STOP  
FOR FUEL ON THE WAY  
0645 KW ARRIVES AT CECIL FIELD  
0650 AS ON SITE - KW + RS AWAIT FOR DRILLERS  
0710 DRILLERS ON SITE - KW CONDUCTS SITE H+S MEETING  
0735 CREW DEPARTS FOR SITE 3  
0750 CREW ON SITE - BEGINS SETTING UP  
0815 CREW SETS UP ON LOCATION POO - BEGINS DRIVING RODS  
0830 CEF-003-POO-05 COLLECTED - RELATIVELY CLEAR H<sub>2</sub>O  
PH: 5.92 TEMP: 26.19°C  
COND: 223  $\mu\text{S}/\text{cm}$  DO: 8.79 mg/L  
ORP: 1.7  
0840 CEF-003-POO-15 COLLECTED - GREY H<sub>2</sub>O  
PH: 5.80 TEMP: 23.87°C  
COND: 197  $\mu\text{S}/\text{cm}$  DO: 0.33 mg/L  
ORP: 16.1  
0851 CEF-003-POO-25 COLLECTED - GREY H<sub>2</sub>O  
PH: 6.29 TEMP: 23.90°C  
COND: 237  $\mu\text{S}/\text{cm}$  DO: 0.27 mg/L  
ORP: -10.9  
0909 CEF-003-POO-35 COLLECTED - GREY H<sub>2</sub>O  
PH: 5.90 TEMP: 24.59°C  
COND: 203  $\mu\text{S}/\text{cm}$  DO: 0.25 mg/L  
ORP: 14.1  
0935 CEF-003-POO-45 COLLECTED - GREY H<sub>2</sub>O - HARD PUSHING 35'  
PH: 7.30 TEMP: 26.65°C  
COND: 520  $\mu\text{S}/\text{cm}$  DO: 0.33 mg/L  
ORP: -206.8  
0940 - CREW BEGINS SETTING UP DECON PIT. - DALE ON SITE WITH  
MOBILE LAB, BEGINS RUNNING SAMPLES

K. Weichert



WHILE CREW IS DECONTAMINATING, KW + RS BEGIN COLLECTING  
CEF-003-SWP00, IN CREEK DUE EAST OF  
DPT P00

1005 CEF-003-SWP00 COLLECTED

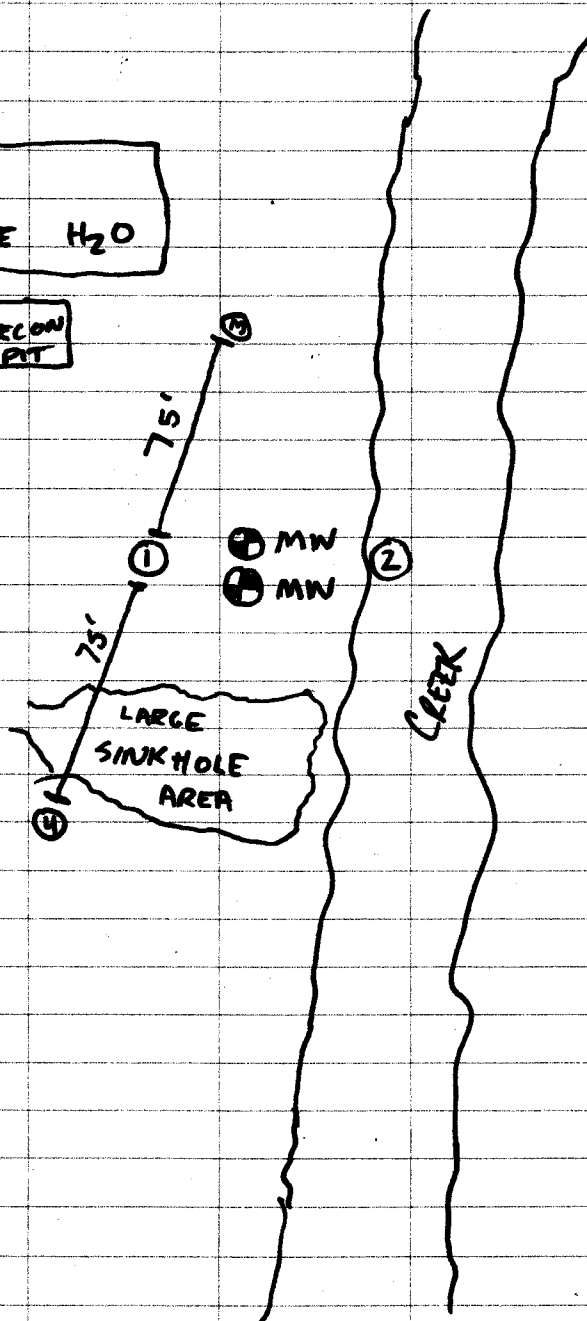
① = CEF-003-P00 - DPT

② = CEF-003-SWP00 - SURFACE H<sub>2</sub>O

DECON  
PIT

③ = CEF-003-P75 - DPT

④ = CEF-003-N75 - DPT



DECON OF ALL SCREENS AND RODS COMPLETED, CREW  
RETURNS TO CEF-003-P00 LOCATION FOR  
SECOND SET OF INTERVALS

\* NOTE - ALL SAMPLES COLLECTED FROM 4' SCREEN. SAMPLE TUBING IS PLACED AT MIDPOINT OF SCREEN. SAMPLE NOMENCLATURE REFLECTS TUBING POSITION. EXAMPLE: CEF-003-P00-35

- SCREENED INTERVAL IS 33'-37' WITH TUBING AT 35' BGS

- CREW BROUGHT MULTIPLE SAMPLING SCREENS. ALL RODS AND SCREENS ARE PULLED AFTER EACH SAMPLE, AND A NEW SCREEN IS THEN INSERTED FOR THE NEXT INTERVAL. CUTTING DOWN ON TOTAL DECON TIME.

1035 CEF-003-P00-10 COLLECTED  
PH: 5.86 TEMP: 25.00 °C  
COND: 167  $\mu\text{S}/\text{cm}$  DO: 1.26  $\text{mg}/\text{L}$   
ORP: 14.9 COLOR: BROWN

1050 CEF-003-P00-20 COLLECTED  
PH: 6.14 TEMP: 25.62 °C  
COND: 202  $\mu\text{S}/\text{cm}$  D.O. 0.72  $\text{mg}/\text{L}$   
ORP: 7.8 COLOR: MILKY WHITE/GREY

1101 CEF-003-P00-30 COLLECTED  
PH: 6.39 TEMP: 26.14 °C  
COND: 203  $\mu\text{S}/\text{cm}$  D.O.: 0.33  
ORP: 2.4 COLOR: GREY

1115 CEF-003-P00-40 COLLECTED  
PH: 6.89 TEMP: 27.88 °C  
COND: 381  $\mu\text{S}/\text{cm}$  D.O.: 0.88  $\text{mg}/\text{L}$   
ORP: -43.9 COLOR: DARK GREY

- LOTS OF AIRPLANE TRAFFIC OVER SITE

1140 CEF-003-P00-50 COLLECTED  
PH: 7.51 TEMP: 27.60 °C  
COND: 538  $\mu\text{S}/\text{cm}$  D.O.: 0.62  $\text{mg}/\text{L}$   
ORP: -177.6 COLOR: LT. GREY

1200 CREW DEPARTS SITE FOR LUNCH BREAK

1240 CREW BACK ON SITE - BEGINS DECON OF SCREENS AND RODS

✓. "A-1" /

CREW SETS UP ON LOCATION CEF-003-P75

-BASED ON MOST CURRENT LAB RESULTS, CREW WILL  
CUT DOWN ON SOME INTERVALS WHERE APPLICABLE

1310 CEF-003-P75-15 COLLECTED

PH: 7.19      TEMP: 27.96 °C  
COND: 313 us/cm      DO: 0.39 mg/L  
ORP: -94.7      COLOR: BROWN

1320 CEF-003-P75-25 COLLECTED

PH: 6.98      TEMP: 25.70 °C  
COND: 320 us/cm      DO: 0.59 mg/L  
ORP: -57.2      COLOR: LT. GREY

1335 CEF-003-P75-35 COLLECTED

PH: 7.35      TEMP: 27.98 °C  
COND: 404 us/cm      DO: 1.44 mg/L  
ORP: -48.7      COLOR: LT GREY

1352 CEF-003-P75-45

PH: 7.74      TEMP: 28.21 °C  
COND: 492 us/cm      DO: 0.66 mg/L  
ORP: -117.9      COLOR: GREY

1415 CEF-003-P75-10 COLLECTED

PH: 6.80      TEMP: 24.87 °C  
COND: 308 us/cm      DO: 1.87 mg/L  
ORP: -24.3      COLOR: BROWN

1425 CEF-003-P75-20 COLLECTED

PH: 6.68      TEMP: 25.77 °C  
COND: 273 us/cm      DO: 1.07 mg/L  
ORP: -32.4      COLOR: LT. GREY

1440 CEF-003-P75-30

PH: 7.15      TEMP: 27.62 °C  
COND: 393 us/cm      DO: 0.60 mg/L  
ORP: -52.3      COLOR: GREY

1450 DRILLERS TAKE SHORT BREAK TO COOL DOWN

1505 CREW BEGINS DECONTAMINATION OF RODS AND SCREENS

CREW MOVES TO LOCATION N75, AND  
BEGINS SETTING UP AND  
DRIVING RODS

1535 CEF-003-N75-15 COLLECTED

PH: 7.41

COND: 296  $\mu\text{S}/\text{cm}$ 

ORP: -41.3

TEMP: 24.17 °C

DO: 0.99 mg/L

COLOR: BROWN

1543 CEF-003-N75-25 COLLECTED

PH: 6.73

COND: 349  $\mu\text{S}/\text{cm}$ 

ORP: -9.3

TEMP: 25.80 °C

DO: 0.84 mg/L

COLOR: LT GREY

1558 CEF-003-N75-35 COLLECTED

PH: 7.01

COND: 313  $\mu\text{S}/\text{cm}$ 

ORP: -86.3

TEMP: 27.35 °C

DO: 0.80 mg/L

COLOR: GREY

1615 CEF-003-N75-10 COLLECTED

PH: 7.29

COND: 374  $\mu\text{S}/\text{cm}$ 

ORP: -22.1

TEMP: 25.59 °C

DO: 0.58 mg/L

COLOR: GREY

1625 CEF-003-N75-20 COLLECTED

PH: 7.11

COND: 228  $\mu\text{S}/\text{cm}$ 

ORP: -26.1

TEMP: 25.92 °C

DO: 0.26 mg/L

COLOR: BROWN

READING  
SWITCH  
KW

1650 CEF-003-N75-30 COLLECTED

PH: 6.96

COND: 364  $\mu\text{S}/\text{cm}$ 

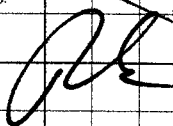
ORP: -121.7

TEMP: 26.22 °C

DO: 0.43 mg/L

COLOR: GREY

1720 Secured site &amp; departed



7/12/11

(5)

112600378

# DPT GW SAMPLING

13 July, 201

PERSONNEL: R. SIMCIK; E. SCRIGNER (TTNUS)  
N. Bishop; B. NAEWORTH (GWP)

VEHICLE: 2006 F-250

PPE: LEVEL "D"

WEATHER: Humid 84°F upon Arrival - Clear / DEPARTURE -  
SUNNY, Humid 92°F

OBJECTIVE: CONTINUED DPT GW SAMPLING AT SITE 3

0700 ZS + RS MEET NB + BN AT SITE 3 GATE

0715 TTNUS + GWP ONSITE AT SITE 3; RS HELD TAIL GATE  
SAFETY MEETING + SPRAYED WORK AREA WITH BUG RETARDANT  
SPRAY.

0740 GWP BEGAN HAND AUGERING AND SET-UP AT LOCATION: CEF-003-P50

0800 CEF-003-P50-15 - COLLECTED

PH = 22.71

TEMP: 22.65

COND: 144

DO: 2.22

ORP: -43.7

COLOR: LT GRAY (DARK)

0820 CEF-003-P50-25 -- COLLECTED

PH = 6.49

TEMP: 21.65

COND = 265

DO = 0.64

ORP = -46.0

COLOR = LT. GRAY

0835 CEF-003-P50-35 -- COLLECTED

PH 6.95

TEMP 24.47

COND 274

DO 0.99

ORP -63.3

COLOR LT. GRAY

0840 moved over 2.5' for collection at 10', 20', and 30' intervals

0840 - CEF-003-P50-10 -- COLLECTED

PH 6.40

TEMP 26.03

COND 299

DO 1.14

ORP -51.3

COLOR

0845. BEGAN PURGING AT CEF-003-WP02-DPT

0905 CEF-003-P50-20 - COLLECTED

PH 6.31

TEMP 26.70

COND 183

DO 0.78

ORP -31.1

COLOR LT. GRAY

23



112600378

DPT GW SAMP

13 July 2011

0915 - CEF-003-WP02-DPT

PH: 6.95

TEMP: 24.37

COND: 250

DO: 6.865 5.86

ORP: -61.8

TURB: 2.97

0925 - CEF-003-PS0-30 -- COLLECTED

PH: 7.00

TEMP: 26.82

COND: 329

DO: 0.33

ORP: -67.1

TEMP COLOR: DK GRAY

0930 NB+BN BEGAN DECONTAMINATING / CLEANING DRILL ROOS IN PREPAR  
 TO MOBILIZE TO THE NEXT SAMPLE LOCATION; 2S SETUP SAMPLING  
 EQUIPMENT AND BEGAN PURGING AT CEF-003-31S

0950 - CEF-003-31S - COLLECTED

PH: 6.55

TEMP: 22.74

COND: 243

DO: 0.39

ORP: -62.4

TURB: 3.03

1000 GWP BEGAN HANDLING AND PUSHING AT CEF-003-N25

1020 - CEF-003-N25-15 -- COLLECTED

PH 6.51

TEMP 28.76

COND 219

DO 0.45

ORP -46.2

COLOR BROWN

1035 - CEF-003-N25-25 -- COLLECTED

PH 6.64

TEMP 31.71

COND 283

DO 0.15

ORP -63.2

COLOR LT. GRAY

1055 CEF-003-N25-35 -- COLLECTED

PH: 6.13

TEMP: 28.21

COND: 158

DO: 0.42

ORP: -43.1

COLOR: DK GRAY

1115 CEF-003-N25-10 -- COLLECTED

PH: 6.56

TEMP: 27.81

COND: 205

DO: 0.14

ORP: -50.4

COLOR: BROWN

1135 - CEF-003-N25-20 -- COLLECTED

PH: 5.68

TEMP: 28.87

COND: 284

DO: 0.43

ORP: -43.9

COLOR: LT. GRAY

1150 CEF-003-N25-30 -- COLLECTED

PH: 6.44

TEMP: 29.99

COND: 242

DO: 0.38

ORP: -42.4

COLOR: DK GRAY

1126

7.65

17

112G00378

DPT GW SAMP

13 July, 86

1200 - TT + GWP BROKE FROM FOR LUNCH

1235 - RESUMED DPT ACTIVITIES

1300 CEF-003-N100-15 -- COLLECTED

PH: 7.28

TEMP: 24.73

COND: 362

DO: 0.98

ORP: -605

COLOR: DK GRAY

1315 CEF-003-N100-25 -- COLLECTED

PH: 6.95

TEMP: 24.57

COND: 296

DO: 0.60

ORP: -54.2

COLOR: LT. GRAY

1330 CEF-003-N100-20 -- COLLECTED

PH: 7.31

TEMP: 24.97

COND: 362

DO: 0.40

ORP: -82.7

COLOR: LT. GRAY

1340 NB+BN (GWP) DECON'D RODS ; CREW TOOK BREAK TO COOL DOWN

1405 - RESUMED WORK AT CEF-003-P100

1425 - CEF-003-P100-15 -- COLLECTED

PH: 6.76

TEMP: 26.85

COND: 264

DO: 0.85

ORP: 62.2

COLOR: BROWN

1440 - CEF-003-P100-25 -- COLLECTED

PH: 7.43

TEMP: 27.50

COND: 429

DO: 0.24

ORP: -133.8

COLOR: LT. GRAY

1500 CEF-003-P100-20 -- COLLECTED

PH: 7.57

TEMP: 27.53

COND: -157.8

DO: 0.11

ORP: 446

COLOR: LT. GRAY

1515 CEF-003-P100-30 -- COLLECTED

PH: 7.35

TEMP: 28.13

COND: 432

DO: 0.27

ORP: -156.3

COLOR: LT. GRAY

1545 CEF-003-P25-15 -- COLLECTED

PH: 6.16

TEMP: 27.90

COND: 163

DO: 0.30

ORP: -38.7

COLOR: LT. BROWN

1600 CEF-003-P25-25 -- COLLECTED

PH: 6.33

ORP: -48.6

DO: 0.25

COND: 217

TEMP: 27.29

COLOR: LT. GRAY

B)

T/ST

112600378

DPT GWSAMP

13 JULY 201

1615 - CEF-003-P25-10 - COLLECTED

PH: 6.64

TEMP: 31.12

COND: 278

DO: 0.65

ORP: -61.9

COLOR: BROWN

1625 - CEF-003-P25-20 - COLLECTED

PH: 6.09

TEMP: 31.51

COND: 228

DO: 0.30

ORP: -22.6

COLOR: LT. GRAY

1645 CEF-003-P25-30 - COLLECTED

PH: 6.84

TEMP: 31.02

COND: 208

DO: 0.36

ORP: -9.49

COLOR: LT. GRAY

1655 CREW (GWP) BEGAN DECON'ING RODS AND SCREENS

1520 DEPARTED SITE; ZS DEPARTED FOR BLDG 536

1535 ZS ARRIVED AT BLDG 536 + EMPTIED PURGE WATER (IDW)  
INTO THE TOTE.

1600 ZS DEPARTED CECIL FIELD

1615  
1/13/11

7/13/11

191

PERSONNEL: R. SIMCIK, K. WEICHERT (T&NUS)  
N. BISHOP, B. NAZWORTH (GWP)

VEHICLE: 2001 F-250, RENTAL

PPE: LEVEL "D"

WEATHER: HOT, HUMID, 90°, PARTLY CLOUDS - HEAT ADVISORY  
IN EFFECT ALL DAY WITH HEAT INDEX NEARING  
110°F, POSSIBLE THUNDERSTORMS

OBJECTIVE: CONTINUE DPT GW SAMPLING AT SITE 3

0530 KW AT T&NUS OFFICE LOADING EQUIPMENT FOR TODAY'S ACTIVITIES

0530 KW DEPARTS FOR NAS CECIL FIELD - WILL STOP FOR ICE ON THE WAY.

0635 KW AT FLIGHT TOWER PARKING LOT, AWAITING ARRIVAL OF CREW

0650 KW PHONES K. DOLLARHIDE TO INFORM HER THAT KW WILL ESCORT  
DRILLERS THROUGH GATE 37 TO OBTAIN H<sub>2</sub>O FOR DRILL  
RIG - KD OKS THIS.

0700 NB+BZ AT TOWER - KW ESCORTS THEM THROUGH GATE 37 TO HYDRANT

0705 RS AT TOWER

0710 DRILLERS FULL OF H<sub>2</sub>O, ALL CREW HEADS TO SITE 3, AND BEGINS  
SETTING UP.

0755 CREW SETS UP ON LOCATION P25, AND BEGINS DRILLING

0808 CEF-003-P25R-20 COLLECTED

PH: 5.92

TEMP: 23.83 °C

COND: 710  $\mu\text{S}/\text{CM}$

DO: 0.26  $\text{mg}/\text{L}$

ORP: 112.1

COLOR: GREY

- SAMPLE OF SAME ID COLLECTED FOR FIXED BASE LAB

0824 CEF-003-P25R-30 COLLECTED

PH: 6.16

TEMP: 25.14 °C

COND: 252  $\mu\text{S}/\text{CM}$

DO: 0.15  $\text{mg}/\text{L}$

ORP: 64.2

COLOR: GREY

- SAMPLE OF SAME ID COLLECTED FOR FIXED BASE LAB

0840 CEF-003-P25R-40 COLLECTED

PH: 6.43

TEMP: 25.05 °C

COND: 377  $\mu\text{S}/\text{CM}$

DO: 0.15  $\text{mg}/\text{L}$

ORP: -1.0

COLOR: GREY

KRW

K. W.

|       |   |           |                |  |  |
|-------|---|-----------|----------------|--|--|
| 0850  | CEF-003-P25R-15                         | COLLECTED |                |  |  |
|       | PH: 6.00                                |           | TEMP: 24.91 °C |  |  |
|       | COND: 175                               | us/cm     | DO: 0.53 mg/L  |  |  |
|       | ORP: 59.7                               |           | COLOR: GREY    |  |  |
| 0900  | CEF-003-P25R-25                         | COLLECTED |                |  |  |
|       | PH: 5.72                                |           | TEMP: 24.88 °C |  |  |
|       | COND: 208                               | us/cm     | DO: 0.16 mg/L  |  |  |
|       | ORP: 91.2                               |           | COLOR: GREY    |  |  |
| 0915  | CEF-003-P25R-35                         | COLLECTED |                |  |  |
|       | PH: 6.26                                |           | TEMP: 25.27 °C |  |  |
|       | COND: 238                               | us/cm     | DO: 0.13 mg/L  |  |  |
|       | ORP: 49.8                               |           | COLOR: GREY    |  |  |
| 0920  | CREW BEGINS DETONAMATING REDS + SCREENS |           |                |  |  |
|       | CREW SETS UP ON LOCATION N50            |           |                |  |  |
| 0952  | CEF-003-N50-10                          | COLLECTED |                |  |  |
|       | PH: 6.96                                |           | TEMP: 25.84 °C |  |  |
|       | COND: 268                               | us/cm     | DO: 0.32 mg/L  |  |  |
|       | ORP: 70.1                               |           | COLOR: BROWN   |  |  |
| 0958  | CEF-003-N50-20                          | COLLECTED |                |  |  |
|       | PH: 6.14                                |           | TEMP: 24.97 °C |  |  |
|       | COND: 298                               | us/cm     | DO: 0.30 mg/L  |  |  |
|       | ORP: 73.4                               |           | COLOR: GREY    |  |  |
| 1010  | CEF-003-N50-40                          | COLLECTED |                |  |  |
|       | PH: 5.33                                |           | TEMP: 25.48 °C |  |  |
|       | COND: 204                               | us/cm     | DO: 0.13 mg/L  |  |  |
|       | ORP: 84.9                               |           | COLOR: GREY    |  |  |
| 1025  | CEF-003-N50-25                          | COLLECTED |                |  |  |
|       | PH: 6.67                                |           | TEMP: 25.11 °C |  |  |
|       | COND: 291                               | us/cm     | DO: 0.27 mg/L  |  |  |
|       | ORP: 58.0                               |           | COLOR: GREY    |  |  |
| 1040  | CEF-003-N50-35                          | COLLECTED |                |  |  |
|       | PH: 6.55                                |           | TEMP: 25.95 °C |  |  |
|       | COND: 212                               | us/cm     | DO: 0.15 mg/L  |  |  |
|       | ORP: 21.8                               |           | COLOR: GREY    |  |  |
| 1045- | CREW MOVES TO LOCATION N75              |           |                |  |  |
| 1105  | CEF-003-N75-45                          | COLLECTED |                |  |  |
|       | PH: 7.10                                |           | TEMP: 26.00 °C |  |  |
|       | COND: 454                               | us/cm     | DO: 0.23 mg/L  |  |  |
|       | ORP: 45.2                               |           | COLOR: GREY    |  |  |

1115 CREW BREAKS FOR LUNCH

1205 CREW BACK ON SITE DECONTAMINATING RODS + SCREENS  
CREW MOVES TO LOCATION P12

1220 CEF-003-P12-15 COLLECTED

PH: 7.60

COND: 198

ORP: -22.6

us/cm

TEMP: 29.38 °C

D.O.: 0.41 mg/L

COLOR: GREY

1228 CEF-003-P12-25 COLLECTED

PH: 5.60

COND: 182

ORP: 49.6

us/cm

TEMP: 27.04 °C

D.O.: 0.44 mg/L

COLOR: GREY

1235 CEF-003-P12-20 COLLECTED

PH: 3.59

COND: 216

ORP: 162.5

us/cm

TEMP: 26.83 °C

D.O.: 0.36 mg/L

COLOR: WHITE/ LT GREY

CREW MOVES TO LOCATION N12

1250 CEF-003-N12-15 COLLECTED

PH: 3.48

COND: 226

ORP: 174.6

us/cm

TEMP: 29.15 °C

D.O.: 0.55 mg/L

COLOR: GREY

1300 CEF-003-N12-25 COLLECTED

PH: 4.04

COND: 278

ORP: 155.5

us/cm

TEMP: 28.23 °C

D.O.: 0.39 mg/L

COLOR: GREY

1305 CEF-003-N12-20 COLLECTED:

PH: 4.17

COND: 272

ORP: 160.5

us/cm

TEMP: 28.32 °C

D.O.: 0.29 mg/L

COLOR: GREY

1330 CREW MOVES TO LOCATION L50

1348 CEF-003-L50-05 COLLECTED - LOW H<sub>2</sub>O PRODUCTION

PH: 7.28

COND: 233

ORP: 49.5

us/cm

TEMP: 28.25 °C

D.O.: 2.40 mg/L

COLOR: BROWN

1407 CEF-003-L50-15 COLLECTED

PH: 6.70

COND: 203

ORP: 49.9

us/cm

TEMP: 28.72 °C

D.O.: 0.15 mg/L

COLOR: BROWN

KDW



1418 CEF-003-L50-25

COLLECTED

PH: 5.70

TEMP: 32.33 °C

COND: 229

uS/cm

DO: 0.39 mg/L

ORP: 120.7

COLOR: GREY

1432 CEF-003-L50-35

COLLECTED

PH: 5.68

TEMP: 27.83 °C

COND: 168

uS/cm

DO: 0.41 mg/L

ORP: 111.2

COLOR: GREY

1452 CEF-003-L50-45

COLLECTED

PH: 5.26

TEMP: 28.38 °C

COND: 446

uS/cm

DO: 0.17 mg/L

ORP: 170.4

COLOR: GREY

1500 DPT SAMPLING COMPLETE - CREW BEGINS FINAL DECON  
AND CLEAN UP.

1515 - KW + RS BEGIN SETTING UP ON DWN25 WELLS  
- LIGHT RAIN STARTS

1540 CEF-003-DWN25-2025-2025-DPT COLLECTED

PH: 5.66

TEMP: 25.64 °C

COND: 338

uS/cm

DO: 0.31 mg/L

ORP: 131.5

COLOR: CLEAR

TURB: 14.86 - FIXED BASED LAB SAMPLE ALSO COLLECTED

1600 CEF-003-DWN25-0510-DPT COLLECTED

PH: 7.40

TEMP: 28.96 °C

COND: 351

uS/cm

DO: 2.51 mg/L

ORP: 98.5

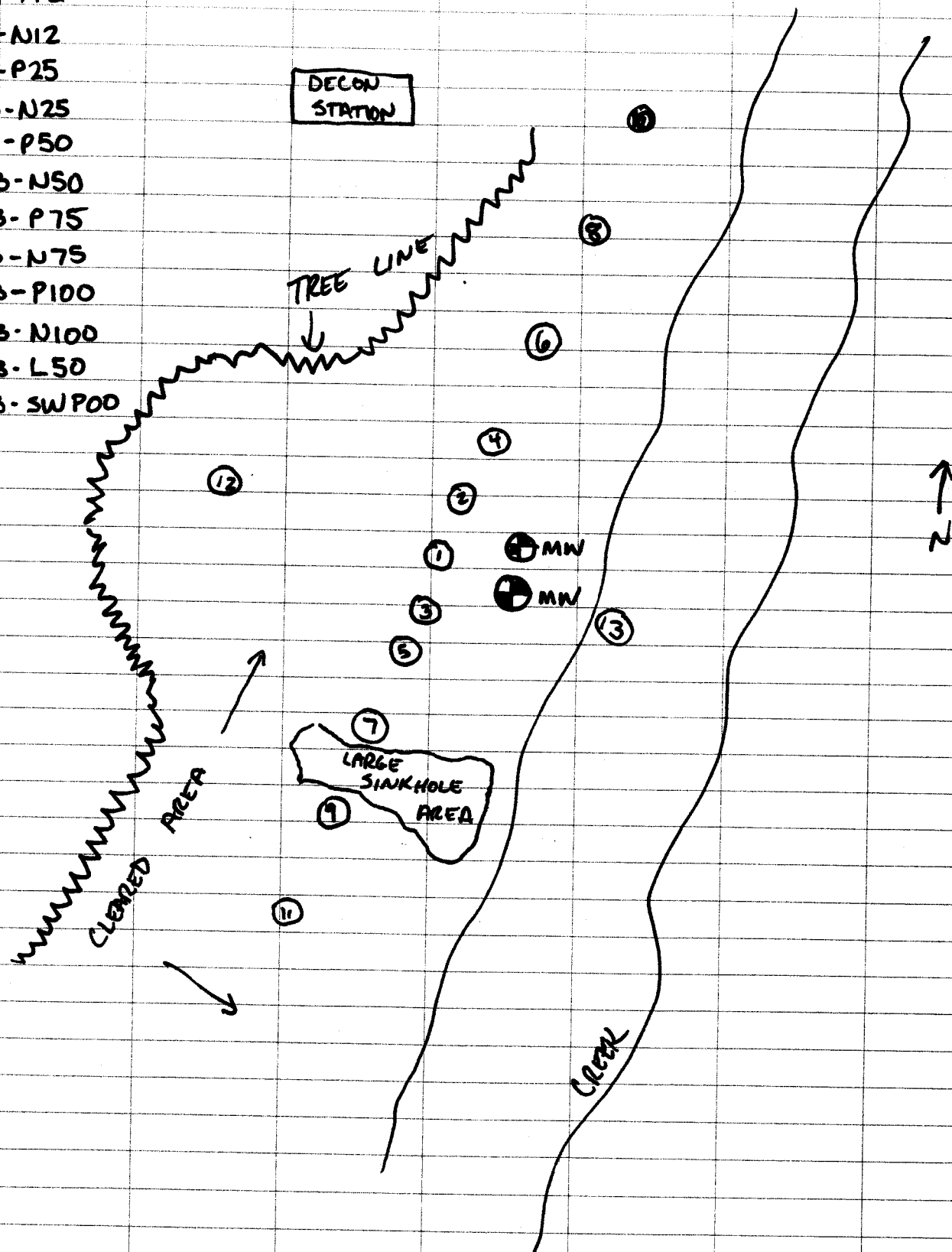
COLOR: CLEAR

TURB: 9.87 NTUS

1700 - ALL CREW MEMBERS DEPART + SECURE SITE.  
- SEE MAP ON NEXT PAGE FOR SAMPLE LOCATIONS

Z. L. L. L.

- ① CEF-003-P00
- ② CEF-003-P12
- ③ CEF-003-N12
- ④ CEF-003-P25
- ⑤ CEF-003-N25
- ⑥ CEF-003-P50
- ⑦ CEF-003-N50
- ⑧ CEF-003-P75
- ⑨ CEF-003-N75
- ⑩ CEF-003-P100
- ⑪ CEF-003-N100
- ⑫ CEF-003-L50
- ⑬ CEF-003-SW P00



|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
|---|------|------------------------------|-------------|---------------------------------------|-------------------|--------------------------------------|---|---|---|---|--|------|--|------|--|--|--|--------------|
| PROJECT NO:<br>112600378  |      | FACILITY:<br>NAS CECIL FIELD |             | PROJECT MANAGER<br>BOB SIMCIK         |                   | PHONE NUMBER<br>412-921-8163         |   | LABORATORY NAME AND CONTACT:<br>KAHTAH DIN ANALYTICAL |   |   |  |      |  |      |  |  |  |              |
| SAMPLERS (SIGNATURE)<br><br>K. WLLT   |      |                              |             | FIELD OPERATIONS LEADER<br>BOB SIMCIK |                   | PHONE NUMBER<br>412-921-8163         |   | ADDRESS<br>95 HUTCHINS DR                             |   |   |  |      |  |      |  |  |  |              |
|   |      |                              |             | CARRIER/WAYBILL NUMBER                |                   |                                      |   | CITY, STATE<br>PORTLAND, ME                           |   |   |  |      |  |      |  |  |  |              |
| STANDARD TAT <input type="checkbox"/><br>RUSH TAT <input type="checkbox"/><br><input type="checkbox"/> 24 hr. <input type="checkbox"/> 48 hr. <input type="checkbox"/> 72 hr. <input checked="" type="checkbox"/> 7 day <input type="checkbox"/> 14 day |      |                              |             |                                       |                   |                                      |   | CONTAINER TYPE<br>PLASTIC (P) or GLASS (G)            |   | TYPE OF ANALYSIS<br>8260B - SELECT VOCs HCl G |  |      |  |      |  |  |  |              |
|   |      |                              |             |                                       |                   |                                      |   | PRESERVATIVE<br>USED                                  |   |   |  |      |  |      |  |  |  |              |
| DATE<br>YEAR  | TIME | SAMPLE ID                    | LOCATION ID | TOP DEPTH (FT)                        | BOTTOM DEPTH (FT) | MATRIX (GW, SO, SW, SD, QC,<br>ETC.) | COLLECTION METHOD<br>GRAB (G)<br>COMP (C) | No. OF CONTAINERS                                     |   |   |  |      |  |      |  |  |  | COMMENTS     |
| 7/14  | 0808 | CEF-003-P25R-20              |             |                                       |                   | GW                                   | G   | 3   | 3 |   |  |      |  |      |  |  |  | -COOL TO 40C |
| 7/14  | 0824 | CEF-003-P25R-30              |             |                                       |                   | GW                                   | G   | 3   | 3 |   |  |      |  |      |  |  |  |              |
| 7/14  | 1540 | CEF-003-DWN25-2025-DPT       |             |                                       |                   | GW                                   | G   | 3   | 3 |   |  |      |  |      |  |  |  |              |
| 7/14  | 0000 | TRIPBLANK                    |             |                                       |                   | QC                                   |   |   |   |   |  |      |  |      |  |  |  | -TRIPBLANK   |
| 7/14  | 0000 | TEMPBLANK                    |             |                                       |                   | QC                                   |   |   |   |   |  |      |  |      |  |  |  | -TEMPBLANK   |
|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
|   |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |
| 1. RELINQUISHED BY<br>K. WLLT   |      |                              |             | DATE<br>7-15-11                       |                   | TIME<br>1100                         |   | 1. RECEIVED BY  |   |   |  | DATE |  | TIME |  |  |  |              |
| 2. RELINQUISHED BY  |      |                              |             | DATE                                  |                   | TIME                                 |   | 2. RECEIVED BY  |   |   |  | DATE |  | TIME |  |  |  |              |
| 3. RELINQUISHED BY  |      |                              |             | DATE                                  |                   | TIME                                 |   | 3. RECEIVED BY  |   |   |  | DATE |  | TIME |  |  |  |              |
| COMMENTS * - 1,1-DICHLOROETHENE, 1,2-DICHLOROBENZENE, 1,4-DICHLOROBENZENE, NAPHTHALENE, TCE, VINYL CHLORIDE,  |      |                              |             |                                       |                   |                                      |   |   |   |   |  |      |  |      |  |  |  |              |

**DISTRIBUTION:**

**WHITE (ACCOMPANIES SAMPLE)**

**YELLOW (FIELD COPY)**

**PINK (FILE COPY)**

4/02R

FORM NO. TtNUS-001



Tetra Tech NUS, Inc.

## DAILY ACTIVITIES RECORD

PROJECT NAME: SITE 3 PROJECT NUMBER: 112600378  
CLIENT: US NAVY LOCATION: .Sec 1 Fuel  
DATE: 7-12-11 ARRIVAL TIME: 0700  
Tt NUS PERSONNEL: K. WEICHERT, R. SIMSICK DEPARTURE TIME: 1720  
CONTRACTOR: GW PROTECTION DRILLER: \_\_\_\_\_

| ITEM           | QUANTITY<br>ESTIMATE | QUANTITY<br>TODAY | PREVIOUS<br>TOTAL<br>QUANTITY | CUMULATIVE<br>QUANTITY<br>TO DATE |
|----------------|----------------------|-------------------|-------------------------------|-----------------------------------|
| 1 DAY DPT SAMP | 3                    | 1                 | 6                             | 1                                 |
|                |                      |                   |                               |                                   |
|                |                      |                   |                               |                                   |
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|                |                      |                   |                               |                                   |

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

APPROVED BY:

[Signature]  
Tt NUS REPRESENTATIVE

[Signature]  
DRILLER

DATE:

7/12/11



Tetra Tech NUS, Inc.

## DAILY ACTIVITIES RECORD

PROJECT NAME: SITE 3 PROJECT NUMBER: 112600 378  
CLIENT: US NAVY LOCATION: CECIL FIELD  
DATE: 07/13/11 ARRIVAL TIME: 0700  
Tt NUS PERSONNEL: Z. SCRIBNER/R. SIMICK DEPARTURE TIME: 1600  
CONTRACTOR: GW P DRILLER: NICK

| ITEM                | QUANTITY<br>ESTIMATE | QUANTITY<br>TODAY | PREVIOUS<br>TOTAL<br>QUANTITY | CUMULATIVE<br>QUANTITY<br>TO DATE |
|---------------------|----------------------|-------------------|-------------------------------|-----------------------------------|
| <u>1 DAY Sample</u> | <u>3</u>             | <u>1</u>          | <u>201</u>                    | <u>2</u>                          |
|                     |                      |                   |                               |                                   |
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COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

APPROVED BY: [Signature]  
Tt NUS REPRESENTATIVE

[Signature]  
DRILLER  
DATE: 7-13-11



Tetra Tech NUS, Inc.

## DAILY ACTIVITIES RECORD

PROJECT NAME: SITE 3 DPT PROJECT NUMBER: 112600378  
CLIENT: US NAVY LOCATION: CERIL  
DATE: 7-14-11 ARRIVAL TIME: 0700  
Tt NUS PERSONNEL: R. SIMCIK, K. WELCHER DEPARTURE TIME: 1600  
CONTRACTOR: GW PROTECTION DRILLER: NICK

| ITEM               | QUANTITY<br>ESTIMATE | QUANTITY<br>TODAY | PREVIOUS<br>TOTAL<br>QUANTITY | CUMULATIVE<br>QUANTITY<br>TO DATE |
|--------------------|----------------------|-------------------|-------------------------------|-----------------------------------|
| 1 DAY DPT SAMPLING | 3                    | 1                 | 2                             | 3                                 |
|                    |                      |                   |                               |                                   |
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|                    |                      |                   |                               |                                   |

COMMENTS:

APPROVED BY:

Tt NUS REPRESENTATIVE

DRILLER

DATE:

7-14-11



## DAILY PROJECT SUMMARY

## GROUNDWATER



## PROTECTION

A Division of DRILLPRO, LLC  
Environmental & Geotechnical Drilling

## DAILY PROJECT SUMMARY

CLIENT NAME: Tetra-TechDRILLER: Nick BishopRIG: 6620APROJECT NAME: Coal Field Site 3WORK ORDER #: 711008DATE: 7/12/11

| WELL/BORING #                           | DPT 1A          | DPT 1B        | DPT 2A        | DPT 2B        | DPT 3A        | DPT 3B        |  |  |
|---|-----------------|---------------|---------------|---------------|---------------|---------------|--|--|
| <b>DIRECT PUSH</b>                      |                 |               |               |               |               |               |  |  |
| Soil Sampling                           |                 |               |               |               |               |               |  |  |
| # of Samples                            |                 |               |               |               |               |               |  |  |
| Total Depth                             |                 |               |               |               |               |               |  |  |
| H <sub>2</sub> O Samples SP15/Profiling |                 |               |               |               |               |               |  |  |
| # of Samples                            | <u>5</u>        | <u>5</u>      | <u>4</u>      | <u>3</u>      | <u>3</u>      | <u>3</u>      |  |  |
| Total Depth                             | <u>52'</u>      | <u>47'</u>    | <u>52'</u>    | <u>37'</u>    | <u>32'</u>    |               |  |  |
| <b>DRILLING</b>                         |                 |               |               |               |               |               |  |  |
| <b>STP Footage / Sonic Sampling</b>     |                 |               |               |               |               |               |  |  |
| 0-50' Below Land Surface                |                 |               |               |               |               |               |  |  |
| 50'-100' Below Land Surface             |                 |               |               |               |               |               |  |  |
| 100'+ Below Land Surface                |                 |               |               |               |               |               |  |  |
| Total Spoons / Samples                  |                 |               |               |               |               |               |  |  |
| <b>WELL / BOREHOLE ABANDONMENT</b>      | <u>Backfill</u> |               |               |               |               |               |  |  |
| Diameter                                |                 |               |               |               |               |               |  |  |
| Depth                                   |                 |               |               |               |               |               |  |  |
| Pad Removal                             |                 |               |               |               |               |               |  |  |
| <b>WELL INFORMATION:</b>                |                 |               |               |               |               |               |  |  |
| Size                                    |                 |               |               |               |               |               |  |  |
| Depth                                   |                 |               |               |               |               |               |  |  |
| Screen Length                           |                 |               |               |               |               |               |  |  |
| <b>SURFACE CASING / DUAL</b>            |                 |               |               |               |               |               |  |  |
| Size                                    |                 |               |               |               |               |               |  |  |
| Depth                                   |                 |               |               |               |               |               |  |  |
| Type: _____                             |                 |               |               |               |               |               |  |  |
| <b>CAPS:</b>                            |                 |               |               |               |               |               |  |  |
| LEP                                     |                 |               |               |               |               |               |  |  |
| Slip Cap                                |                 |               |               |               |               |               |  |  |
| <b>COVER:</b>                           |                 |               |               |               |               |               |  |  |
| Flush Cover                             |                 |               |               |               |               |               |  |  |
| Above Grade Protector                   |                 |               |               |               |               |               |  |  |
| Bumper Post                             |                 |               |               |               |               |               |  |  |
| Bolt Down Cover                         |                 |               |               |               |               |               |  |  |
| <b>WELL DEVELOPMENT TIME:</b>           |                 |               |               |               |               |               |  |  |
| Pumping                                 |                 |               |               |               |               |               |  |  |
| <b>STEAM CLEANING # HOURS:</b>          | <u>10 min</u>   | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> |  |  |
| <b>CLEAN-UP # HOURS:</b>                | <u>1 hr</u>     |               |               |               |               |               |  |  |

To the best of my knowledge, the quantities indicated are correct, and I know of no injuries, loss of, or damage to equipment or near miss incidents that occurred during this project.

[Signature]  
Signature of Client Field Representative

Rob Simcik  
Printed Name of Client Field Representative

7/12/11  
Date Signed

## GROUNDWATER



## PROTECTION

A Division of DRILLPRO, LLC  
Environmental & Geotechnical Drilling

## DAILY PROJECT SUMMARY

## DAILY PROJECT SUMMARY

CLIENT NAME: Tetra - TechDRILLER: Nick BishopRIG: 6620APROJECT NAME: Cool Field Site 3WORK ORDER #: 711008DATE: 7/12/11

## OVERNIGHT:

☒ Yes ☐ No

## CREW MEMBERS:

Nick B  
Bryan N

## HOURS WORKED:

Time On Site: 700  
Lunch: 12-1230  
Time Off Site: 1720

## MATERIALS USED / PURCHASED:

|           |       |               |               |
|-----------|-------|---------------|---------------|
| Sand      | _____ | Riser         | _____         |
| Fine Sand | _____ | Screen        | _____         |
| Bentonite | _____ | Pre-Packed    | _____         |
| Portland  | _____ | Manholes      | _____         |
| Concrete  | _____ | Sample Tubing | <u>1,000'</u> |
| Locks     | _____ | Exp. Points   | <u>24 sps</u> |
| Cones     | _____ | LEP           | _____         |
| Other     | _____ | Other         | _____         |

## EQUIPMENT RENTAL:

Rental Company: \_\_\_\_\_  
Equipment Rental: \_\_\_\_\_  
Rental Company: \_\_\_\_\_  
Equipment Rental: \_\_\_\_\_  
Reason: \_\_\_\_\_  
# of Days: \_\_\_\_\_  
Cost: \_\_\_\_\_  
Other: \_\_\_\_\_

## DRUMS:

# Drums Supplied \_\_\_\_\_  
Time Spent Relocating Drums On Site \_\_\_\_\_

## MISCELLANEOUS:

Pavement Cutting (hrs.): \_\_\_\_\_  
Concrete Coring: \_\_\_\_\_  
Decontamination Structure: \_\_\_\_\_

## STANDBY TIME:

Hour / Date / Time \_\_\_\_\_  
Reason \_\_\_\_\_

## DESCRIPTION OF SIGNIFICANT PROBLEMS / ADDITIONAL COMMENTS:

Moved To Site Day before, 7/11  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

To the best of my knowledge, the quantities indicated are correct, and I know of no injuries, loss of, or damage to equipment or near miss incidents that occurred during this project.

[Signature]  
Signature of Client Field Representative

Rob Simcik  
Printed Name of Client Field Representative

7/12/11  
Date Signed

# DAILY PROJECT SUMMARY

## GROUNDWATER



## PROTECTION

A Division of DRILLPRO, LLC  
Environmental & Geotechnical Drilling

# DAILY PROJECT SUMMARY

CLIENT NAME: Tetra Tech DRILLER: Dick Bishop RIG: 6620A  
PROJECT NAME: Coal Field Site 3 WORK ORDER #: 711008 DATE: 7/13/11

| WELL/BORING #                           | DPT 4A          | DPT 4B        | DPT 5A        | DPT 5B        | DPT 6A        | DPT 6B        | DPT 7A        | DPT 7B        | DPT 8         |
|---|-----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>DIRECT PUSH</b>                      |                 |               |               |               |               |               |               |               |               |
| Soil Sampling                           |                 |               |               |               |               |               |               |               |               |
| # of Samples                            |                 |               |               |               |               |               |               |               |               |
| Total Depth                             |                 |               |               |               |               |               |               |               |               |
| H <sub>2</sub> O Samples SP15/Profiling |                 |               |               |               |               |               |               |               |               |
| # of Samples                            | <u>3</u>        | <u>3</u>      | <u>2</u>      | <u>3</u>      | <u>3</u>      | <u>3</u>      | <u>2</u>      | <u>2</u>      | <u>3</u>      |
| Total Depth                             | <u>35'</u>      | <u>20'</u>    | <u>25'</u>    | <u>30'</u>    | <u>35'</u>    | <u>30'</u>    | <u>25'</u>    | <u>30'</u>    | <u>25'</u>    |
| <b>DRILLING</b>                         |                 |               |               |               |               |               |               |               |               |
| STP Footage / Sonic Sampling            |                 |               |               |               |               |               |               |               |               |
| 0-50' Below Land Surface                |                 |               |               |               |               |               |               |               |               |
| 50'-100' Below Land Surface             |                 |               |               |               |               |               |               |               |               |
| 100'+ Below Land Surface                |                 |               |               |               |               |               |               |               |               |
| Total Spoons / Samples                  |                 |               |               |               |               |               |               |               |               |
| <b>WELL / BOREHOLE ABANDONMENT</b>      | <u>Backfill</u> |               |               |               |               |               |               |               |               |
| Diameter                                |                 |               |               |               |               |               |               |               |               |
| Depth                                   |                 |               |               |               |               |               |               |               |               |
| Pad Removal                             |                 |               |               |               |               |               |               |               |               |
| <b>WELL INFORMATION:</b>                |                 |               |               |               |               |               |               |               |               |
| Size                                    |                 |               |               |               |               |               |               |               |               |
| Depth                                   |                 |               |               |               |               |               |               |               |               |
| Screen Length                           |                 |               |               |               |               |               |               |               |               |
| <b>SURFACE CASING / DUAL</b>            |                 |               |               |               |               |               |               |               |               |
| Size                                    |                 |               |               |               |               |               |               |               |               |
| Depth                                   |                 |               |               |               |               |               |               |               |               |
| Type:                                   |                 |               |               |               |               |               |               |               |               |
| <b>CAPS:</b>                            |                 |               |               |               |               |               |               |               |               |
| LEP                                     |                 |               |               |               |               |               |               |               |               |
| Slip Cap                                |                 |               |               |               |               |               |               |               |               |
| <b>COVER:</b>                           |                 |               |               |               |               |               |               |               |               |
| Flush Cover                             |                 |               |               |               |               |               |               |               |               |
| Above Grade Protector                   |                 |               |               |               |               |               |               |               |               |
| Bumper Post                             |                 |               |               |               |               |               |               |               |               |
| Bolt Down Cover                         |                 |               |               |               |               |               |               |               |               |
| <b>WELL DEVELOPMENT TIME:</b>           |                 |               |               |               |               |               |               |               |               |
| Pumping                                 |                 |               |               |               |               |               |               |               |               |
| <b>STEAM CLEANING # HOURS:</b>          | <u>10 min</u>   | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> |
| <b>CLEAN-UP # HOURS:</b>                | <u>1 hr</u>     |               |               |               |               |               |               |               |               |

To the best of my knowledge, the quantities indicated are correct, and I know of no injuries, loss of, or damage to equipment or near miss incidents that occurred during this project.

K. Helt  
Signature of Client Field Representative

KEVIN WEICHERT  
Printed Name of Client Field Representative

7/14/11  
Date Signed

# DAILY PROJECT SUMMARY

## GROUNDWATER



## PROTECTION

A Division of DRILLPRO, LLC  
Environmental & Geotechnical Drilling

# DAILY PROJECT SUMMARY

CLIENT NAME: Tetra-Tech

DRILLER: Nick Bishop RIG: 6620A

PROJECT NAME: ceel Field site 3

WORK ORDER #: 711008 DATE: 7/13/11

OVERNIGHT: ☒ Yes ☐ No  
CREW MEMBERS: Nick B  
Byron N

HOURS WORKED:  
Time On Site: 700  
Lunch: 12 - 1230  
Time Off Site: 5 15

### MATERIALS USED / PURCHASED:

|           |       |               |                 |
|-----------|-------|---------------|-----------------|
| Sand      | _____ | Riser         | _____           |
| Fine Sand | _____ | Screen        | _____           |
| Bentonite | _____ | Pre-Packed    | _____           |
| Portland  | _____ | Manholes      | _____           |
| Concrete  | _____ | Sample Tubing | <u>1000'</u>    |
| Locks     | _____ | Exp. Points   | <u>24 28 15</u> |
| Cones     | _____ | LEP           | _____           |
| Other     | _____ | Other         | _____           |

### EQUIPMENT RENTAL:

|                   |       |
|-------------------|-------|
| Rental Company:   | _____ |
| Equipment Rental: | _____ |
| Rental Company:   | _____ |
| Equipment Rental: | _____ |
| Reason:           | _____ |
| # of Days:        | _____ |
| Cost:             | _____ |
| Other:            | _____ |

### DRUMS:

# Drums Supplied \_\_\_\_\_  
Time Spent Relocating Drums On Site 1

### MISCELLANEOUS:

Pavement Cutting (hrs.): \_\_\_\_\_  
Concrete Coring: \_\_\_\_\_  
Decontamination Structure: \_\_\_\_\_

### STANDBY TIME:

Hour / Date / Time \_\_\_\_\_  
Reason \_\_\_\_\_

### DESCRIPTION OF SIGNIFICANT PROBLEMS / ADDITIONAL COMMENTS:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

To the best of my knowledge, the quantities indicated are correct, and I know of no injuries, loss of, or damage to equipment or near miss incidents that occurred during this project.

[Signature]  
Signature of Client Field Representative

KEVIN WILKINSON  
Printed Name of Client Field Representative

7-14-11  
Date Signed

## DAILY PROJECT SUMMARY

## GROUNDWATER



## PROTECTION

A Division of DRILLPRO, LLC  
Environmental & Geotechnical Drilling

## DAILY PROJECT SUMMARY

CLIENT NAME: Tetra Tech DRILLER: Dick Bishop RIG: 6670 D  
PROJECT NAME: Cool Field site 3 WORK ORDER #: 714008 DATE: 7/14/11

| WELL/BORING #                           | DPT 9A          | DPT 9B        | DPT 10A       | DPT 10B       | DPT 10A       | DPT 11B       | DPT 12A       | DPT 12B       | DPT 13        |
|---|-----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>DIRECT PUSH</b>                      |                 |               |               |               |               |               |               |               |               |
| Soil Sampling                           |                 |               |               |               |               |               |               |               |               |
| # of Samples                            | <u>3</u>        | <u>2</u>      | <u>3</u>      | <u>3</u>      | <u>2</u>      | <u>1</u>      | <u>2</u>      | <u>1</u>      | <u>5</u>      |
| Total Depth                             | <u>35'</u>      | <u>30'</u>    | <u>35'</u>    | <u>30'</u>    | <u>25'</u>    | <u>20'</u>    | <u>25'</u>    | <u>20'</u>    | <u>45'</u>    |
| H <sub>2</sub> O Samples SP15/Profiling |                 |               |               |               |               |               |               |               |               |
| # of Samples                            |                 |               |               |               |               |               |               |               |               |
| Total Depth                             |                 |               |               |               |               |               |               |               |               |
| <b>DRILLING</b>                         |                 |               |               |               |               |               |               |               |               |
| <b>STP Footage / Sonic Sampling</b>     |                 |               |               |               |               |               |               |               |               |
| 0-50' Below Land Surface                |                 |               |               |               |               |               |               |               |               |
| 50'-100' Below Land Surface             |                 |               |               |               |               |               |               |               |               |
| 100'+ Below Land Surface                |                 |               |               |               |               |               |               |               |               |
| Total Spoons / Samples                  |                 |               |               |               |               |               |               |               |               |
| <b>WELL / BOREHOLE ABANDONMENT</b>      | <u>Borefill</u> |               |               |               |               |               |               |               |               |
| Diameter                                |                 |               |               |               |               |               |               |               |               |
| Depth                                   |                 |               |               |               |               |               |               |               |               |
| Pad Removal                             |                 |               |               |               |               |               |               |               |               |
| <b>WELL INFORMATION:</b>                |                 |               |               |               |               |               |               |               |               |
| Size                                    |                 |               |               |               |               |               |               |               |               |
| Depth                                   |                 |               |               |               |               |               |               |               |               |
| Screen Length                           |                 |               |               |               |               |               |               |               |               |
| <b>SURFACE CASING / DUAL</b>            |                 |               |               |               |               |               |               |               |               |
| Size                                    |                 |               |               |               |               |               |               |               |               |
| Depth                                   |                 |               |               |               |               |               |               |               |               |
| Type:                                   |                 |               |               |               |               |               |               |               |               |
| <b>CAPS:</b>                            |                 |               |               |               |               |               |               |               |               |
| LEP                                     |                 |               |               |               |               |               |               |               |               |
| Slip Cap                                |                 |               |               |               |               |               |               |               |               |
| <b>COVER:</b>                           |                 |               |               |               |               |               |               |               |               |
| Flush Cover                             |                 |               |               |               |               |               |               |               |               |
| Above Grade Protector                   |                 |               |               |               |               |               |               |               |               |
| Bumper Post                             |                 |               |               |               |               |               |               |               |               |
| Bolt Down Cover                         |                 |               |               |               |               |               |               |               |               |
| <b>WELL DEVELOPMENT TIME:</b>           |                 |               |               |               |               |               |               |               |               |
| Pumping                                 |                 |               |               |               |               |               |               |               |               |
| <b>STEAM CLEANING # HOURS:</b>          | <u>10 min</u>   | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> | <u>10 min</u> |
| <b>CLEAN-UP # HOURS:</b>                | <u>1 hr</u>     |               |               |               |               |               |               |               |               |

To the best of my knowledge, the quantities indicated are correct, and I know of no injuries, loss of, or damage to equipment or near miss incidents that occurred during this project.

[Signature]  
Signature of Client Field Representative

KEVIN WEICHERT  
Printed Name of Client Field Representative

7-14-11  
Date Signed

## DAILY PROJECT SUMMARY

## GROUNDWATER



## PROTECTION

A Division of DRILLPRO, LLC  
Environmental & Geotechnical Drilling

## DAILY PROJECT SUMMARY

CLIENT NAME: Tetra Tech DRILLER: Nick B RIG: 6620A  
PROJECT NAME: Cecil Field Site 3 WORK ORDER #: 711008 DATE: 7/14/11

OVERNIGHT: ☒ Yes ☐ No

CREW MEMBERS: Nick B  
Bryan N

## HOURS WORKED:

Time On Site: 700  
Lunch: 12 - 1230  
Time Off Site: 400

## MATERIALS USED / PURCHASED:

|           |       |               |               |
|-----------|-------|---------------|---------------|
| Sand      | _____ | Riser         | _____         |
| Fine Sand | _____ | Screen        | _____         |
| Bentonite | _____ | Pre-Packed    | _____         |
| Portland  | _____ | Manholes      | _____         |
| Concrete  | _____ | Sample Tubing | <u>1000'</u>  |
| Locks     | _____ | Exp. Points   | <u>23 sps</u> |
| Cones     | _____ | LEP           | _____         |
| Other     | _____ | Other         | _____         |

## EQUIPMENT RENTAL:

Rental Company: \_\_\_\_\_  
Equipment Rental: \_\_\_\_\_  
Rental Company: \_\_\_\_\_  
Equipment Rental: \_\_\_\_\_  
Reason: \_\_\_\_\_  
# of Days: \_\_\_\_\_  
Cost: \_\_\_\_\_  
Other: \_\_\_\_\_

## DRUMS:

# Drums Supplied \_\_\_\_\_  
Time Spent Relocating Drums On Site /

## MISCELLANEOUS:

Pavement Cutting (hrs.): \_\_\_\_\_  
Concrete Coring: /  
Decontamination Structure: \_\_\_\_\_

## STANDBY TIME:

Hour / Date / Time \_\_\_\_\_  
Reason \_\_\_\_\_

## DESCRIPTION OF SIGNIFICANT PROBLEMS / ADDITIONAL COMMENTS:

To the best of my knowledge, the quantities indicated are correct, and I know of no injuries, loss of, or damage to equipment or near miss incidents that occurred during this project.

[Signature]  
Signature of Client Field Representative

KEVIN WELCHERT  
Printed Name of Client Field Representative

7-14-11  
Date Signed



### Equipment Inspection Checklist for Drill/DPT Rigs

Company: GEW PROTECTION

Unit/Serial No#: GEO PROBE 6670

Inspection Date: 7/12/11 Time: 67:15

Equipment Type: DPT  
(e.g. Drill Rigs Hollow Stem, Mud Rotary, Direct Push, HDD)

Project Name: SITE 3

Project No#: 112600378

| Yes                                 | No                                  | NA                                  | Requirement   | Comments |
|-------------------------------------|-------------------------------------|-------------------------------------|---|----------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | Emergency Stop Devices  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Emergency Stop Devices (At points of operation)   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Have all emergency shut offs identified been communicated to the field crew?  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Has a person been designated as the Emergency Stop Device Operator?   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | Highway Use   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Cab, mirrors, safety glass?   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?                                   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Seat Belts?   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Is the equipment equipped with audible back-up alarms and back-up lights?   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | • Horn and gauges   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Brake condition (dynamic, park, etc.)   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Tires (Tread) or tracks   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Windshield wipers   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Exhaust system  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Steering (standard and emergency)   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | • Wheel Chocks?   |          |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | • Are tools and material secured to prevent movement during transport? Especially those within the cab?                           |          |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | • Are there flammables or solvents or other prohibited substances stored within the cab?  |          |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | • Are tools or debris in the cab that may adversely influence operation of the vehicle (in and around brakes, clutch, gas pedals) |          |

Equipment Inspection Checklist for Drill Rigs  
Page 2

Unit/Serial No#: GEOPROBE 6620

Inspection Date: 7/12/11

| Yes   | No   | NA   | Requirement  | Comments |
|---|--|--|--|----------|
| <input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/> | <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> | <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/>                                       | <b>Fluid Levels:</b> <ul style="list-style-type: none"> <li>• Engine oil</li> <li>• Transmission fluid</li> <li>• Brake fluid</li> <li>• Cooling system fluid</li> <li>• Hoses and belts</li> <li>• Hydraulic oil</li> </ul>   |          |
| <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/>  | <input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/>  | <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/>   | <b>High Pressure Hydraulic Lines</b> <ul style="list-style-type: none"> <li>• Obvious damage</li> <li>• Operator protected from accidental release</li> <li>• Coupling devices, connectors, retention cables/pins are in good condition and in place</li> </ul>  |          |
| <input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/> | <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> | <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/>                                       | <b>Mast Condition</b> <ul style="list-style-type: none"> <li>• Structural components/tubing</li> <li>• Connection points</li> <li>• Pins</li> <li>• Welds</li> <li>• Outriggers</li> <li>• Operational</li> <li>• Plumb (when raised)</li> </ul>   |          |
| <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/>  | <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/>                             | <input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/><br><input checked="" type="checkbox"/> | <b>Hooks</b> <ul style="list-style-type: none"> <li>• Are the hooks equipped with Safety Latches?</li> <li>• Does it appear that the hook is showing signs of wear in excess of 10% original dimension?</li> <li>• Is there a bend or twist exceeding 10% from the plane of an unbent hook?</li> <li>• Increase in throat opening exceeding 15% from new condition</li> <li>• Excessive nicks and/or gouges</li> <li>• Clips</li> <li>• Number of U-Type (Crosby) Clips<br/>(cable size 5/16 - 5/8 = 3 clips minimum)<br/>(cable size 3/4 - 1 inch = 4 clips minimum)<br/>(cable size 1 1/8 - 1 3/8 inch = 5 clips minimum)</li> </ul> |          |

# Equipment Inspection Checklist for Drill Rigs

Page 3

Unit/Serial No#: GEOPROBE 6620

Inspection Date: 7/12/11

| Yes                                 | No                                  | NA                                  | Requirement   | Comments |
|-------------------------------------|-------------------------------------|-------------------------------------|---|----------|
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Power cable and/or hoist cable <ul style="list-style-type: none"> <li>Reduction in Rope diameter π<br/>(5/16 wire rope &gt; 1/64 reduction nominal size -replace)<br/>(3/8 to 1/2 wire rope &gt; 1/32 reduction nominal size -replace)<br/>(9/16 to 3/4 wire rope &gt; 3/64 reduction nominal size -replace)</li> </ul> |          |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> <li>Number of broken wires<br/>(6 randomly broken wires in one rope lay)<br/>(3 broken wires in one strand)</li> </ul>   |          |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> <li>Number of wire rope wraps left on the Running Drum at nominal use (≥3 required)</li> </ul>   |          |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> <li>Lead (primary) sheave is centered on the running drum</li> </ul>   |          |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> <li>Lubrication of wire rope (adequate?)</li> </ul>  |          |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> <li>Kinks, bends - Flattened to &gt; 50% diameter</li> </ul>   |          |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Hemp/Fiber rope (Cathead/Split Spoon Hammer) <ul style="list-style-type: none"> <li>Minimum 3/4; maximum 1 inch rope diameter (Inspect for physical damage)</li> </ul>  |          |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> <li>Rope to hammer is securely fastened</li> </ul>   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | Safety Guards - <ul style="list-style-type: none"> <li>Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?</li> </ul>   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <ul style="list-style-type: none"> <li>Hot pipes and surfaces exposed to accidental contact?</li> </ul>   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <ul style="list-style-type: none"> <li>High pressure lines</li> </ul>   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> <li>Nip/pinch points</li> </ul>  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | Operator Qualifications <ul style="list-style-type: none"> <li>Does the operator have proper licensing where applicable, (e.g., CDL)?</li> </ul>  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <ul style="list-style-type: none"> <li>Does the operator, understand the equipment's operating instructions?</li> </ul>   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <ul style="list-style-type: none"> <li>Is the operator experienced with this equipment?</li> </ul>  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <ul style="list-style-type: none"> <li>Is the operator 21 years of age or more?</li> </ul>  |          |

Equipment Inspection Checklist for Drill Rigs

Page 4

Unit/Serial No#: GLOPBE 10620

Inspection Date: 7/12/11

| Yes                                 | No                       | NA                       | Requirement   | Comments |
|-------------------------------------|--------------------------|--------------------------|---|----------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | PPE Required for Drill Rig Exclusion Zone                                   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Hardhat   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Safety glasses  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Work gloves   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Chemical resistant gloves _____   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Steel toed Work Boots   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Chemical resistant Boot Covers  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Apron   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Coveralls Tyvek, Saranex, cotton)   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Other Hazards   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Excessive Noise Levels? _____ dBA   |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Chemical hazards (Drilling supplies - Sand, bentonite, grout, fuel, etc.) |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - MSDSs available?  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | • Will On-site fueling occur  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - Safety cans available?  |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - Fire extinguisher (Type/Rating - _____ )                                  |          |

Approved for Use ☒ Yes ☐ No ☐ See Comments

K. Williams  
Site Health and Safety Officer

[Signature]  
Operator

**ATTACHMENT 5**

**EQUIPMENT MANUFACTURES INFORMATION  
(CUT SHEETS)**

## **SOLAR PANELS**



# STP190S - 24/Ad+ STP185S - 24/Ad+

**SUNTECH**  
Solar powering a green future™

## 190 Watt

### MONOCRYSTALLINE SOLAR MODULE

#### Features



High module conversion efficiency (up to 14.9%), through superior manufacturing technology



Guaranteed 0-5W positive power output tolerance ensures high reliability



Proprietary Gallium-F22 doping process dramatically reduces initial light-induced degradation to <1%, thus delivering better power and performance over time



New Jumbo cells with 4% larger solar cell area produce more power per module



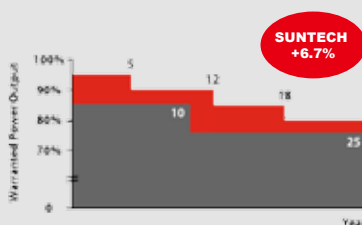
Entire module certified to withstand high wind loads (2400 Pascal) and snow loads (5400 Pascal) \*



#### Trust Suntech to Deliver Reliable Performance Over Time

- World's leading manufacturer of crystalline silicon photovoltaic modules
- Unrivaled manufacturing capacity and world-class technology
- Rigorous quality control meeting the highest international standards : ISO 9001: 2008 and ISO 14001: 2004
- Certification and standards: IEC 61215, IEC 61730, conformity to CE

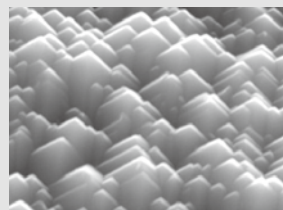
#### Industry-leading warranty



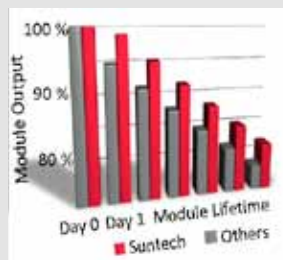
- 25 year transferrable power output warranty: 5 year/95%, 12 year/90%, 18 year/85%, 25 year/80% \*\*
- Based on nominal power
- Warrants 6.7% more power than the market standard over 25 years
- 5 year material and workmanship warranty

\* Please refer to Suntech Standard Module Installation Manual for details.

\*\* Please refer to Suntech Product Warranty for details.



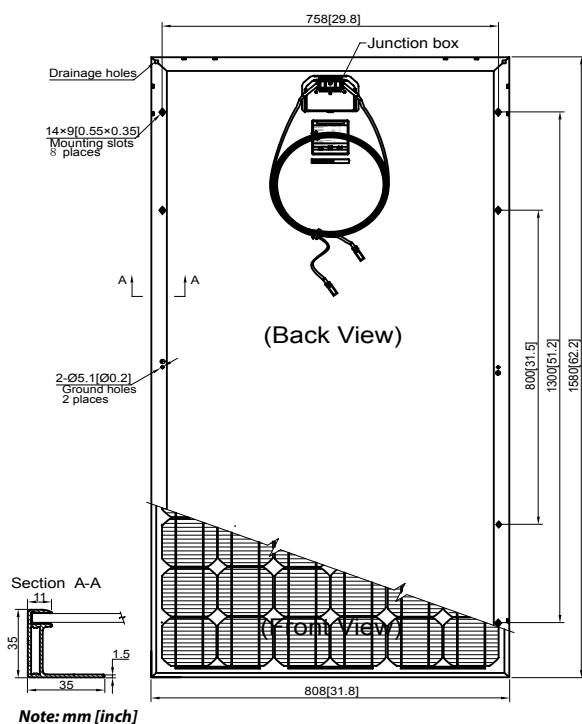
Patented surface pyramids enhance sunlight absorption by redirecting reflected light to other areas on the cell surface to be reabsorbed



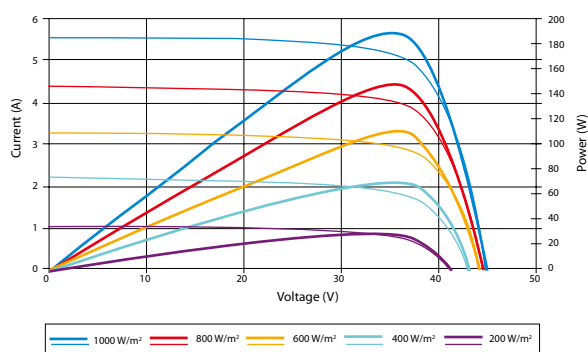
Suntech cells feature a breakthrough process that replaces traditional boron doping with gallium doping. The effect of initial light-induced degradation is dramatically reduced, leading to greater power output over the entire module lifetime.

Graph is for illustration only and does not imply any guarantee of module performance. Please check warranty for details.

## STP190S-24/Ad+ STP185S-24/Ad+



Current-Voltage & Power-Voltage Curve (190S-24)



## Temperature Characteristics

|   |            |
|---|------------|
| Nominal Operating Cell Temperature (NOCT) | 45±2°C     |
| Temperature Coefficient of Pmax           | -0.48 %/°C |
| Temperature Coefficient of Voc            | -0.34 %/°C |
| Temperature Coefficient of Isc            | 0.037 %/°C |

### Dealer information box

## Electrical Characteristics

| STC                             | STP190S-24/Ad+   | STP185S-24/Ad+ |
|---------------------------------|------------------|----------------|
| Optimum Operating Voltage (Vmp) | 36.5 V           | 36.4 V         |
| Optimum Operating Current (Imp) | 5.20 A           | 5.09 A         |
| Open - Circuit Voltage (Voc)    | 45.2 V           | 45.0 V         |
| Short - Circuit Current (Isc)   | 5.62 A           | 5.43 A         |
| Maximum Power at STC (Pmax)     | 190 W            | 185 W          |
| Module Efficiency               | 14.9%            | 14.5%          |
| Operating Temperature           | -40 °C to +85 °C | -40°C to +85°C |
| Maximum System Voltage          | 600 V DC         | 600 V DC       |
| Maximum Series Fuse Rating      | 15 A             | 15 A           |
| Power Tolerance                 | 0/+5 W           | 0/+5 W         |

STC: Irradiance 1000 W/m², module temperature 25 °C, AM=1.5

| NOCT   | STP190S-24/Ad+ | STP185S-24/Ad+ |
|--|----------------|----------------|
| Maximum Power (W)                                    | 139 W          | 135 W          |
| Maximum Power Voltage (V)                            | 33.1 V         | 33.0 V         |
| Maximum Power Current (A)                            | 4.19 A         | 4.10 A         |
| Open Circuit Voltage (Voc)                           | 41.3 V         | 41.0 V         |
| Short Circuit Current (Isc)                          | 4.56 A         | 4.40 A         |
| Efficiency Reduction<br>(from 1000 W/m² to 200 W/m²) | <4.5%          | <4.5%          |

NOCT: Irradiance 800 W/m², ambient temperature 20 °C, wind speed 1 m/s

## Mechanical Characteristics

|               |   |
|---------------|---|
| Solar Cell    | Monocrystalline 125 × 125 mm (5 inches)   |
| No. of Cells  | 72 (6 × 12)   |
| Dimensions    | 1580 × 808 × 35mm (62.2 × 31.8 × 1.4 inches)  |
| Weight        | 15.5 kgs (34.1 lbs.)  |
| Front Glass   | 3.2 mm (0.13 inches) tempered glass   |
| Frame         | Anodized aluminium alloy  |
| Junction Box  | IP67 rated  |
| Output Cables | H+S RADOX® SMART cable 4.0 mm² (0.006 inches²), symmetrical lengths (-) 1000 mm (39.4 inches) and (+) 1000 mm (39.4 inches), H4 connectors (MC4 compatible) |

## Packing Configuration

| Container             | 20' GP | 40' GP |
|-----------------------|--------|--------|
| Pieces per pallet     | 26     | 26     |
| Pallets per container | 12     | 28     |
| Pieces per container  | 312    | 728    |

Specifications are subject to change without further notification

## **OIL-LESS COMPRESSORS**

WOB-L™



# 2660/2680 SERIES

## MODELS

### Standard models

2660CE44

2660CGHI42

2680CE44

2680CGHI42

*Other models based  
on availability and  
minimum purchase.*

2660CE37 ←

2660CE39

2660CGHI37

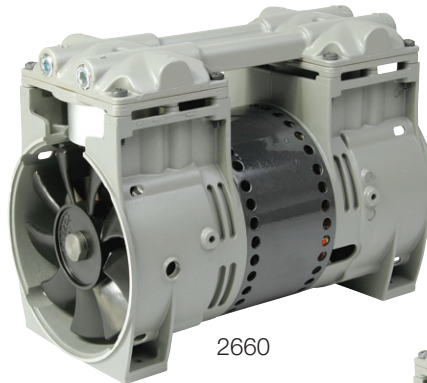
2660CGHI39

2680CE37

2680CE39

2680CGHI37

2680CGHI39



2660



2680

## FEATURES

- Head design allows easily replaced piston seal
- Oil-less, non-lube piston and cylinder
- Permanently lubricated bearings
- Stainless steel valves
- Lightweight die cast aluminum components
- Long-life, high performance piston seal
- Thin wall, hard-coated aluminum cylinder for maximum heat transfer
- Twin fans provide cooling air through and around motor and cylinders
- Dual intake/exhaust manifold system for easy piping
- Balanced for smooth, low vibration operation
- Field service capability
- Inlet filter
- Capacitor
- All wetted aluminum parts treated for corrosion protection from moisture
- Patented one piece head for fewer parts and reduced leak paths
- UL Recognized motor and thermal protector, 115v/60Hz models
- CE/TUV approved, 220-240/50Hz models  
(Consult factory for non-standard models)
- Kit options: Guards/Capacitor cover/Cords

Consult factory for custom applications

ISO 9001  
CERTIFIED

**THOMAS**  
A Gardner Denver Product

# 2660 & 2680 Series Performance Data

|                                       |                    |                        |           |                      |           | Standard             |           |
|---------------------------------------|--------------------|------------------------|-----------|----------------------|-----------|----------------------|-----------|
| MODEL NUMBERS                         |                    | → 2660CE37<br>2680CE37 |           | 2660CE39<br>2680CE39 |           | 2660CE44<br>2680CE44 |           |
| HEAD CONFIGURATION                    |                    | Pressure/Vacuum        |           | Pressure/Vacuum      |           | Pressure/Vacuum      |           |
| STROKE                                |                    | .370 Inches            |           | .390 Inches          |           | .440 Inches          |           |
| PRESSURE                              |                    | Flow @ 115v            |           | Flow @ 115v          |           | Flow @ 115v          |           |
| CFM @ PSI                             | LPM @ bar          |                        |           |                      |           |                      |           |
| PSI                                   | bar                | CFM                    | LPM       | CFM                  | LPM       | CFM                  | LPM       |
| 0                                     | 0                  | 3.73                   | 105.6     | 3.92                 | 110.9     | 4.40                 | 124.5     |
| 5                                     | .5                 | 3.65                   | 101.8     | 3.82                 | 105.9     | 4.34                 | 121.4     |
| 10                                    | 1.0                | 3.53                   | 95.6      | 3.65                 | 98.5      | 4.23                 | 114.6     |
| 15                                    | 1.5                | 3.36                   | 88.9      | 3.46                 | 92.1      | 4.03                 | 107.0     |
| 20                                    | 2.0                | 3.20                   | 81.9      | 3.31                 | 85.7      | 3.84                 | 100.0     |
| 25                                    | 3.0                | 3.03                   | 70.4      | 3.15                 |           | 3.67                 |           |
| 30                                    |                    | 2.86                   |           | 3.00                 |           | 3.50                 |           |
| 35                                    |                    | 2.71                   |           | 2.90                 |           |                      |           |
| 40                                    |                    | 2.58                   |           |                      |           |                      |           |
| MAX. CONTINUOUS PRESSURE              |                    | 40 PSI                 | 2.8 bar   | 35 PSI               | 2.4 bar   | 30 PSI               | 2.1 bar   |
| MAX. INTERMITTENT PRESSURE            |                    | 40 PSI                 | 2.8 bar   | 35 PSI               | 2.4 bar   | 30 PSI               | 2.1 bar   |
| VACUUM                                |                    | Flow @ 115v            |           | Flow @ 220v/230v     |           | Flow @ 115v          |           |
| CFM @ IN. hg                          | LPM @ mbar (gauge) |                        |           |                      |           |                      |           |
| IN. hg                                | mbar (gauge)       | CFM                    | LPM       | CFM                  | LPM       | CFM                  | LPM       |
| 0                                     | 0                  | 3.73                   | 105.6     | 3.92                 | 110.9     | 4.40                 | 124.5     |
| 5                                     | -100               | 2.47                   | 84.5      | 2.62                 | 89.2      | 2.96                 | 100.5     |
| 10                                    | -200               | 1.86                   | 66.8      | 1.98                 | 70.9      | 2.22                 | 80.0      |
| 15                                    | -400               | 1.27                   | 46.6      | 1.36                 | 49.7      | 1.52                 | 55.6      |
| 20                                    | -600               | 0.68                   | 26.8      | 0.72                 | 28.6      | 0.83                 | 32.4      |
| 25                                    | -800               | 0.11                   | 7.5       | 0.12                 | 8.0       | 0.16                 | 9.7       |
| MAX. VACUUM                           |                    | 27.0" hg               | -914 mbar | 27.0" hg             | -914 mbar | 27.0" hg             | -914 mbar |
| MAX. AMBIENT AIR TEMP.                |                    | 104° F                 | 40°C      | 104° F               | 40°C      | 104° F               | 40°C      |
| MIN. AMBIENT START TEMP.              |                    | 50° F                  | 10°C      | 50° F                | 10°C      | 50° F                | 10°C      |
| MAX. RESTART PRESSURE                 |                    | 0 PSI                  | 0 bar     | 0 PSI                | 0 bar     | 0 PSI                | 0 bar     |
| MAX. RESTART VACUUM                   |                    | 0"hg                   | 0 mbar    | 0"hg                 | 0 mbar    | 0"hg                 | 0 mbar    |
| MOTOR VOLTAGE/FREQUENCY               |                    | 115/60/1               |           | 115/60/1             |           | 115/60/1             |           |
| MOTOR TYPE                            |                    | Permanent Split Cap.   |           | Permanent Split Cap. |           | Permanent Split Cap. |           |
| CURRENT AT RATED LOAD (AMPS)          |                    | 4.5                    |           | 4.7                  |           | 5.0                  |           |
| POWER AT RATED LOAD (WATTS)           |                    | 480                    |           | 490                  |           | 530                  |           |
| STARTING CURRENT (LOCKED ROTOR, AMPS) |                    | 14.6                   |           | 14.6                 |           | 14.6                 |           |
| CAPACITOR VALUE                       |                    | 15 mfd                 |           | 15 mfd               |           | 15 mfd               |           |
| MIN. FULL LOAD SPEED (RPM)            |                    | 1680                   |           | 1690                 |           | 1670                 |           |
| THERMAL PROTECTOR                     |                    | Yes                    |           | Yes                  |           | Yes                  |           |
| NET WEIGHT                            |                    | 14.8 lbs.              | 6.7 kg    | 14.8 lbs.            | 6.7 kg    | 14.8 lbs.            | 6.7 kg    |

The information presented in this material is based on technical data and test results of nominal units. It is believed to be accurate and reliable and is offered as an aid to help in the selection of Thomas products. It is the responsibility of the user to determine the suitability of the product for his intended use and the user assumes all risk and liability whatsoever in connection therewith. Thomas Industries does not warrant, guarantee or assume any obligation or liability in connection with this information.

**NOTE:** Models pictured are representative of the series and do not represent a specific model number. Consult factory for detailed physical description.

**NOTE:** 2660 models do not have fan guard or cord standard, these are options. 2680 models include fan guard and cord standard.

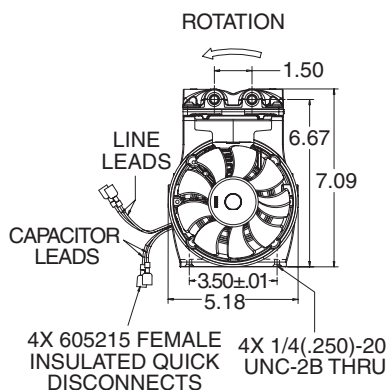
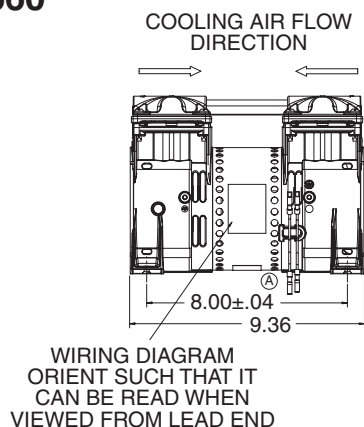
# 2660 & 2680 Series Performance Data

|  |                    |                          |              |                          |              | Standard                 |               |
|--|--------------------|--------------------------|--------------|--------------------------|--------------|--------------------------|---------------|
| MODEL NUMBERS                            |                    | 2660CGHI37<br>2680CGHI37 |              | 2660CGHI39<br>2680CGHI39 |              | 2660CGHI42<br>2680CGHI42 |               |
| HEAD CONFIGURATION                       |                    | Pressure/Vacuum          |              | Pressure/Vacuum          |              | Pressure/Vacuum          |               |
| STROKE                                   |                    | .370 Inches              |              | .390 Inches              |              | .420 Inches              |               |
| PRESSURE                                 |                    | Flow @ 220v/230v/60Hz    |              | Flow @ 220v/230v         |              | Flow @ 220v/230v         |               |
| CFM @ PSI                                | LPM @ bar          |                          |              |                          |              |                          |               |
| PSI                                      | bar                | CFM                      | LPM          | CFM                      | LPM          | CFM                      | LPM           |
| 0  | 0                  | 3.12 / 3.74              | 88.3 / 105.9 | 3.38 / 4.01              | 95.7 / 113.5 | 3.59 / 4.30              | 101.6 / 121.7 |
| 5  | .5                 | 3.05 / 3.65              | 85.2 / 102.0 | 3.30 / 3.92              | 91.7 / 109.0 | 3.50 / 4.08              | 97.5 / 114.5  |
| 10                                       | 1.0                | 2.96 / 3.55              | 80.4 / 96.1  | 3.17 / 3.77              | 86.1 / 101.3 | 3.38 / 4.00              | 91.8 / 108.4  |
| 15                                       | 1.5                | 2.83 / 3.38              | 75.5 / 90.2  | 3.03 / 3.56              | 80.8 / 94.0  | 3.23 / 3.81              | 85.7 / 100.2  |
| 20                                       | 2.0                | 2.71 / 3.24              | 70.8 / 84.5  | 2.90 / 3.38              | 75.9 / 87.2  | 3.08 / 3.60              | 80.0 / 93.4   |
| 25                                       | 3.0                | 2.59 / 3.09              | 60.1 / 71.6  | 2.77 / 3.21              | 66.8 / 74.3  | 2.93 / 3.43              |               |
| 30                                       |                    | 2.48 / 2.96              |              | 2.66 / 3.05              |              | 2.80 / 3.27              |               |
| 35                                       |                    | 2.33 / 2.77              |              | 2.53 / 2.88              |              |                          |               |
| 40                                       |                    | 2.21 / 2.63              |              | 2.43 / 2.73              |              |                          |               |
| MAX. CONTINUOUS PRESSURE                 |                    | 40 PSI                   | 2.8 bar      | 40 PSI                   | 2.8 bar      | 30 PSI                   | 2.1 bar       |
| MAX. INTERMITTENT PRESSURE               |                    | 40 PSI                   | 2.8 bar      | 40 PSI                   | 2.8 bar      | 30 PSI                   | 2.1 bar       |
| VACUUM                                   |                    | Flow @ 220v/230v/60Hz    |              | Flow @ 220v/230v         |              | Flow @ 220v/230v         |               |
| CFM @ IN. hg                             | LPM @ mbar (gauge) |                          |              |                          |              |                          |               |
| IN. hg                                   | mbar (gauge)       | CFM                      | LPM          | CFM                      | LPM          | CFM                      | LPM           |
| 0  | 0                  | 3.12 / 3.74              | 88.3 / 105.9 | 3.38 / 4.01              | 95.7 / 113.5 | 3.59 / 4.30              | 101.6 / 121.7 |
| 5  | -100               | 2.17 / 2.54              | 72.4 / 85.8  | 2.30 / 2.70              | 77.6 / 91.6  | 2.44 / 2.84              | 81.3 / 94.7   |
| 10                                       | -200               | 1.65 / 1.89              | 58.7 / 68.5  | 1.76 / 2.02              | 62.3 / 72.9  | 1.83 / 2.13              | 65.9 / 76.7   |
| 15                                       | -400               | 1.12 / 1.30              | 41.2 / 47.4  | 1.20 / 1.39              | 44.0 / 50.7  | 1.26 / 1.47              | 45.9 / 53.5   |
| 20                                       | -600               | 0.61 / 0.69              | 23.8 / 27.4  | 0.66 / .75               | 25.6 / 29.5  | 0.65 / .81               | 26.2 / 31.4   |
| 25                                       | -800               | 0.10 / 0.11              | 6.8 / 7.6    | 0.11 / .12               | 7.4 / 8.3    | 0.11 / .15               | 7.3 / 9.3     |
| MAX. VACUUM                              |                    | 27.0" hg                 | -914 mbar    | 27.0" hg                 | -914 mbar    | 27.0" hg                 | -914 mbar     |
| MAX. AMBIENT AIR TEMP.                   |                    | 104° F                   | 40°C         | 104° F                   | 40°C         | 104° F                   | 40°C          |
| MIN. AMBIENT START TEMP.                 |                    | 50° F                    | 10°C         | 50° F                    | 10°C         | 50° F                    | 10°C          |
| MAX. RESTART PRESSURE                    |                    | 0 PSI                    | 0 bar        | 0 PSI                    | 0 bar        | 0 PSI                    | 0 bar         |
| MAX. RESTART VACUUM                      |                    | 0"hg                     | 0 mbar       | 0"hg                     | 0 mbar       | 0"hg                     | 0 mbar        |
| MOTOR VOLTAGE/FREQUENCY                  |                    | 220-240/50/1 - 230/60/1  |              | 220-240/50/1 - 230/60/1  |              | 220-240/50/1 - 230/60/1  |               |
| MOTOR TYPE                               |                    | Permanent Split Cap.     |              | Permanent Split Cap.     |              | Permanent Split Cap.     |               |
| CURRENT AT RATED LOAD (AMPS)             |                    | 1.9 / 9.2                |              | 2.0 / 2.2                |              | 1.9 / 2.2                |               |
| POWER AT RATED LOAD (WATTS)              |                    | 425 / 480                |              | 435 / 485                |              | 405 / 475                |               |
| STARTING CURRENT<br>(LOCKED ROTOR, AMPS) |                    | 5.8 / 5.6                |              | 5.8 / 5.6                |              | 5.8 / 5.6                |               |
| CAPACITOR VALUE                          |                    | 15 mfd                   |              | 15 mfd                   |              | 15 mfd                   |               |
| MIN. FULL LOAD SPEED (RPM)               |                    | 1360 / 1640              |              | 1360 / 1640              |              | 1400 / 1680              |               |
| THERMAL PROTECTOR                        |                    | Yes                      |              | Yes                      |              | Yes                      |               |
| NET WEIGHT                               |                    | 15 lbs.                  | 6.8 kg       | 15 lbs.                  | 6.8 kg       | 15 lbs.                  | 6.8 kg        |



# Dimensions

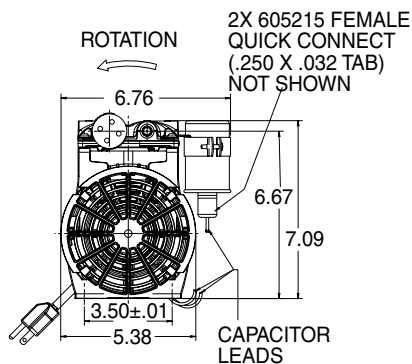
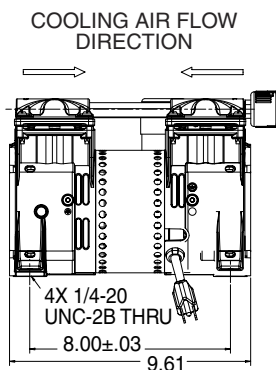
## 2660



| MODEL     | A             |
|-----------|---------------|
| 2668      | #8-32 UNC-2B  |
| 2688      | THREAD THRU   |
| 2660/2669 | 1/4-20 UNC-2B |
| 2680/2689 | THREAD THRU   |

Patent No. 6056521

## 2680



| MODEL     | A             |
|-----------|---------------|
| 2668      | #8-32 UNC-2B  |
| 2688      | THREAD THRU   |
| 2660/2669 | 1/4-20 UNC-2B |
| 2680/2689 | THREAD THRU   |

Patent No. 6056521

**THOMAS**  
A Gardner Denver Product

**Thomas Products Division**  
1419 Illinois Ave  
Sheboygan, WI 53082 USA  
Phone: (920) 457-4891  
Fax: (920) 451-4276  
www.thomaspumps.com

## **EQUIPMENT CABINETS**

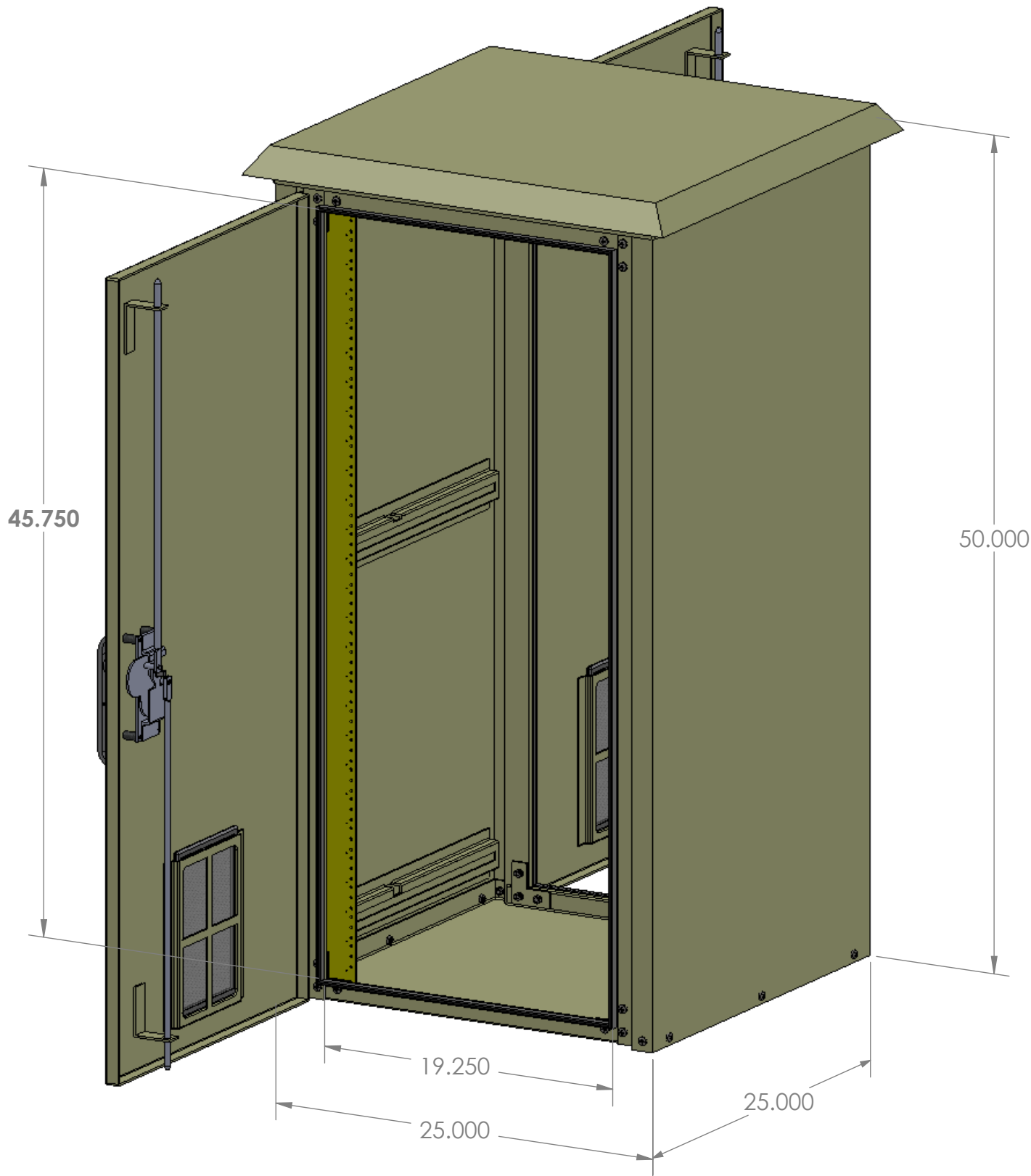
This is the OD-50DX(C) Outdoor Rack Mount Enclosure.  
This cabinet comes standard with the following components:

- {2} Poly Filters
- {1} Set of 19" EIA Standard Racking Rails
- {2} 3 Point Locking Handles

Options for this cabinet include:

- Air Conditioner
- Back Up Fan Unit
- Mounting Brackets
- Bases
  - Pad
  - Pedestal
- I Hooks
- Casters
- C-Channel Feet
- Spoolbox
- Windlocks
- Alarm Switches
- Lexan Windows
- Fan Kits
- Lightbars
- Power Strips
- Junction Boxes
- 2 Outlet 110V Recepticles
- 4 Outlet 110V Recepticles
- GFI Outlets
  - Covered, Uncovered
  - Switched, Unswitched
  - Dual GFI, Single GFI w/ 2 outlet 110V recept.
- 220V Twist
- Flex Heaters
  - 100w, 300w, 600w
- HVL {400w Fan Heater}
- Insulation
- Grounding Studs
- Extra 19" EIA Standard Rails
- 23" EIA Standard Rails
- Vibrabobbins
- Shelves
  - SMT, MT, SMT Fan
- Battery Trays
  - Center Racked, Mid Racked
- Batteries
  - Various Amp Hours Available

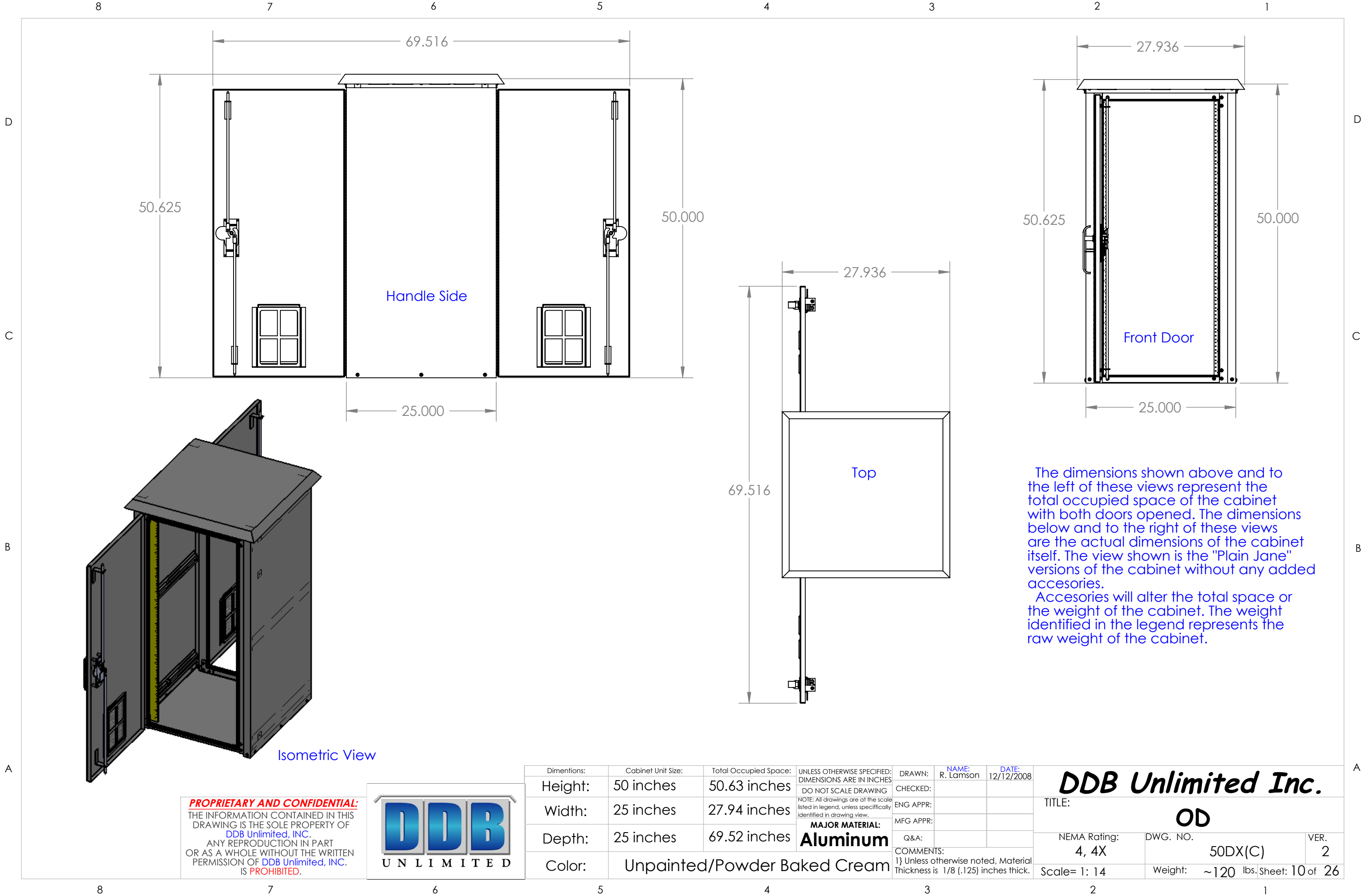
The 50 inch tall cabinet has a usable racking space of 27RU.  
The racking space is centered in the door opening. The opening for the door is 19.25 inches wide by 45.75 inches high.



**PROPRIETARY AND CONFIDENTIAL:**  
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REPRODUCTION IN PART OR AS A WHOLE  
WITHOUT THE WRITTEN PERMISSION OF  
DDB Unlimited, INC IS  
PROHIBITED.



|            |                              |                             |   |  |                 |                 |   |           |                     |           |
|------------|------------------------------|-----------------------------|---|--|-----------------|-----------------|---|-----------|---------------------|-----------|
| Dimention: |                              | Dimention Unit:             | UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES | DRAWN:   | NAME: R. Lamson | DATE: 12/3/2008 | <div>DDB Unlimited Inc.</div>                   |           |                     |           |
| Height:    | 50 inches                    |                             |   | CHECKED:   |                 |                 |   |           |                     |           |
| Width:     | 25 inches                    | DO NOT SCALE DRAWING        | ENG APPR:   |  |                 |                 | TITLE:<br><div>OD</div>                         |           |                     |           |
| Depth:     | 25 inches                    | MAJOR MATERIAL:<br>Aluminum | MFG APPR:   |  |                 |                 |   |           |                     |           |
|            |                              |                             | Q&A:  |  |                 |                 |   | SIZE<br>A | DWG. NO.<br>50DX(C) | VER.<br>2 |
| Color:     | Powder Baked Cream/Unpainted |                             |   | COMMENTS:<br>1. Unless otherwise noted, Material Thickness is 1/8 (.125) inches thick. |                 |                 | Scale= 1: 8    Weight:~120 lbs    Sheet 9 of 26 |           |                     |           |
|            |                              |                             |   |  |                 |                 |   |           |                     |           |



The dimensions shown above and to the left of these views represent the total occupied space of the cabinet with both doors opened. The dimensions below and to the right of these views are the actual dimensions of the cabinet itself. The view shown is the "Plain Jane" versions of the cabinet without any added accesories.

Accesories will alter the total space or the weight of the cabinet. The weight identified in the legend represents the raw weight of the cabinet.

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|              |                              |                       |  |   |                    |                     |                                   |                            |                  |
|--------------|------------------------------|-----------------------|--|---|--------------------|---------------------|-----------------------------------|----------------------------|------------------|
| Dimenitions: | Cabinet Unit Size:           | Total Occupied Space: | UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>DO NOT SCALE DRAWING  | DRAWN:  | NAME:<br>R. Lamson | DATE:<br>12/12/2008 | <b>DDB Unlimited Inc.</b>         |                            |                  |
| Height:      | 50 inches                    | 50.63 inches          | NOTE: All drawings are at the scale<br>listed in legend, unless specifically<br>identified in drawing view.<br><br><b>MAJOR MATERIAL:</b><br><b>Aluminum</b> | CHECKED:  |                    |                     | TITLE:                            |                            |                  |
| Width:       | 25 inches                    | 27.94 inches          |  | ENG APPR:   |                    |                     | <b>OD</b>                         |                            |                  |
| Depth:       | 25 inches                    | 69.52 inches          |  | MFG APPR:   |                    |                     | NEMA Rating:<br><b>4, 4X</b>      | DWG. NO.<br><b>50DX(C)</b> | VER.<br><b>2</b> |
| Color:       | Unpainted/Powder Baked Cream |                       |  | Q&A:  |                    |                     | Scale= 1: 14                      |                            |                  |
|              |                              |                       |  | COMMENTS:<br>1) Unless otherwise noted, Material<br>Thickness is 1/8 (.125) inches thick. |                    |                     | Weight: ~120 lbs. Sheet: 10 of 26 |                            |                  |

## **PROGRAMMABLE TIMING RELAYS**

## EASY Intelligent Relays Product Family Overview



**EASY Intelligent Relays**

The EASY intelligent relays combine timers, relays, counters, special functions, inputs and outputs into one compact device that is easily programmed. The EASY family of products provides an exception level of flexibility together with substantial savings of commissioning time and effort.

The EASY intelligent relays are available in more than 35 styles that support from 12 I/O up to a network of up to 320 I/O points, providing the ideal solution for lighting, energy management, industrial control, irrigation, pump control, HVAC and home automation.

Once EASY products are installed, changes are easily accomplished through front panel programming, eliminating the need to change wiring and minimizing downtime.

## Application Description

The EASY intelligent relays excel in traditional applications where multiple relays, timers and pushbuttons are used. Applications span residential, commercial and industrial installations.

Typical control applications are:

- Car washes
- Automatic doors
- Commercial and residential lighting
- Pump control
- 12 Vdc automotive
- Greenhouse
- Machinery
- Irrigation
- Heating and air conditioning



EASY 500/700/800/MFD  
Intelligent Relays



EASY 500/700/800/MFD Intelligent Relays

General Description

Three families make up the EASY intelligent relay product line. Models are available with and without displays. DIN rail mounted.

**EASY500 Series**—for controlling small applications with up to 12 input/output signals.

**EASY700 Series**—for controlling medium-sized applications with 20 I/O points (expandable to 40 I/O points).

**EASY800 Series**—for controlling large-scale applications with 20 points, expandable to 40 points locally, and expandable using the **EASY-NET** network up to 320 I/O points.

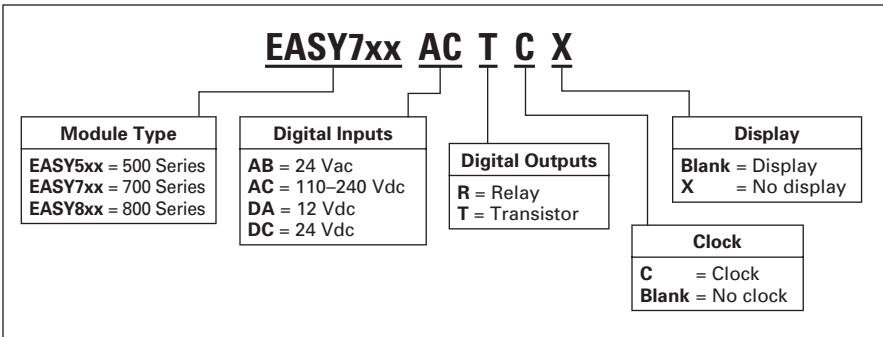
The **EASY-NET** integrated network provides easy and inexpensive linking of up to eight EASY800 devices over a distance of up to 1000 meters. Each EASY800 device can run its own program, or be used as a distributed input/output module. Connect up to eight controllers with up to 40 I/O to obtain 320 I/O.

Standards and Certifications

- EN 50178
- IEC/EN 60947
- UL
- CSA
- CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C

Catalog Number Selection

Table 34.2-1. EASY500/700/800 Module Definition Catalog Numbering System



**Note:** Not all combinations are possible. See product selection tables.

Product Selection

EASY500 Intelligent Relays



EASY500 with Display



EASY500 without Display

Table 34.2-2. EASY500 Intelligent Relays

| Description      | Inputs |             |        |        |          | Outputs |            | Catalog Number |
|------------------|--------|-------------|--------|--------|----------|---------|------------|----------------|
|                  | 24 Vac | 110–240 Vac | 12 Vdc | 24 Vdc | Analog ① | Relay   | Transistor |                |
| Display          |        |             |        |        |          |         |            |                |
| 12 I/O, no clock | —      | 8           | —      | —      | —        | 4       | —          | EASY512-AC-R   |
|                  | —      | —           | —      | 8      | 2        | 4       | —          | EASY512-DC-R   |
| 12 I/O, clock    | 8      | —           | —      | —      | 2        | 4       | —          | EASY512-AB-RC  |
|                  | —      | 8           | —      | —      | —        | 4       | —          | EASY512-AC-RC  |
|                  | —      | —           | 8      | —      | 2        | 4       | —          | EASY512-DA-RC  |
|                  | —      | —           | —      | 8      | 2        | 4       | —          | EASY512-DC-RC  |
|                  | —      | —           | —      | 8      | 2        | —       | 4          | EASY512-DC-TC  |
| No Display       |        |             |        |        |          |         |            |                |
| 12 I/O, clock    | 8      | —           | —      | —      | 2        | 4       | —          | EASY512-AB-RCX |
|                  | —      | 8           | —      | —      | —        | 4       | —          | EASY512-AC-RCX |
|                  | —      | —           | 8      | —      | 2        | 4       | —          | EASY512-DA-RCX |
|                  | —      | —           | —      | 8      | 2        | 4       | —          | EASY512-DC-RCX |
|                  | —      | —           | —      | 8      | 2        | —       | 4          | EASY512-DC-TCX |

① Analog inputs optional. Use of analog inputs will result in a decrease in the same number of available digital inputs.

## Technical Data and Specifications

**Table 34.2-5. EASY500 Series**

| Type  | EASY512-AB...   | EASY512-AC...                          | EASY512-DA...                          | EASY512-DC-R...                        | EASY512-DC-TC...                       |
|---|---|--|--|--|--|
| Supply voltage                                  | 24 Vac  | 100–240 Vac                            | 12 Vdc                                 | 24 Vdc                                 | 24 Vdc                                 |
| Heat dissipation                                | 5 VA  | 5 VA                                   | 2W                                     | 2W                                     | 2W                                     |
| Continuous current outputs <sup>①</sup>         | 8A  | 8A                                     | 8A                                     | 8A                                     | 0.5A                                   |
| Short-circuit proof with power factor 1         | Line protection B16, 600A   |  |  |  | —                                      |
| Short-circuit proof with power factor 0.7...0.7 | Line protection B16, 900A   |  |  |  | —                                      |
| Mounting  | On top-hat rail to DIN 50022, 35 mm or screw mounting with EASYB4-101-GF1 fixing brackets |  |  |  |  |
| Connection cables—solid                         | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12)  | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12) | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12) | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12) | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12) |
| Connection cables—flexible                      | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12)  | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12) | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12) | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12) | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12) |
| Degree of protection                            | IP 20   | IP 20                                  | IP 20                                  | IP 20                                  | IP 20                                  |
| RFI suppression                                 | EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4  |  |  |  |  |
| Ambient operating temperature                   | –25° to 55°C  | –25° to 55°C                           | –25° to 55°C                           | –25° to 55°C                           | –25° to 55°C                           |
| Transport and storage temperature               | –40° to 70°C  | –40° to 70°C                           | –40° to 70°C                           | –40° to 70°C                           | –40° to 70°C                           |
| Hazardous location                              | CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C                                    |  |  |  |  |

<sup>①</sup> Relay = 8A (10A to UL) with resistive load, 3A with inductive load. Transistor outputs = 0.5A/24 Vdc, maximum four outputs switchable in parallel.

**Table 34.2-6. EASY700 Series**

| Type  | EASY719-AB...   | EASY719-AC...                          | EASY719-DA...                          | EASY719-DC-RC...                       | EASY721-DC-TC...                       |
|---|---|--|--|--|--|
| Supply voltage                                  | 24 Vac  | 100–240 Vac                            | 12 Vdc                                 | 24 Vdc                                 | 24 Vdc                                 |
| Heat dissipation                                | 7 VA  | 10 VA                                  | 3.5W                                   | 3.5W                                   | 3.5W                                   |
| Continuous current outputs <sup>②</sup>         | 8A  | 8A                                     | 8A                                     | 8A                                     | 0.5A                                   |
| Short-circuit proof with power factor 1         | Line protection B16, 600A   | Line protection B16, 600A              | Line protection B16, 600A              | Line protection B16, 600A              | —                                      |
| Short-circuit proof with power factor 0.7...0.7 | Line protection B16, 900A   | Line protection B16, 900A              | Line protection B16, 900A              | Line protection B16, 900A              | —                                      |
| Mounting  | On top-hat rail to DIN 50022, 35 mm or screw mounting with EASYB4-101-GF1 fixing brackets |  |  |  |  |
| Connection cables—solid                         | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12)  | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12) | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12) | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12) | 0.2–4.0 mm <sup>2</sup><br>(AWG 22-12) |
| Connection cables—flexible                      | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12)  | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12) | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12) | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12) | 0.2–2.5 mm <sup>2</sup><br>(AWG 22-12) |
| Degree of protection                            | IP 20   | IP 20                                  | IP 20                                  | IP 20                                  | IP 20                                  |
| RFI suppression                                 | EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4  |  |  |  |  |
| Ambient operating temperature                   | –25° to 55°C  | –25° to 55°C                           | –25° to 55°C                           | –25° to 55°C                           | –25° to 55°C                           |
| Transport and storage temperature               | –40° to 70°C  | –40° to 70°C                           | –40° to 70°C                           | –40° to 70°C                           | –40° to 70°C                           |
| Hazardous location                              | CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C                                    |  |  |  |  |

<sup>②</sup> Relay = 8A (10A to UL) with resistive load, 3A with inductive load. Transistor outputs = 0.5A/24 Vdc, maximum four outputs switchable in parallel.

Table 34.2-7. EASY800 Series

| Type  | EASY819-AC...  | EASY819-DC-RC...                    | EASY820-DC-RC...                    | EASY821-DC-TC...                    | EASY822-DC-TC...                    |
|---|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Supply voltage                                  | 100–240 Vac  | 24 Vdc                              | 24 Vdc                              | 24 Vdc                              | 24 Vdc                              |
| Heat dissipation                                | 10 VA  | 3.4W                                | 3.4W                                | 3.4W                                | 3.4W                                |
| Continuous current outputs <sup>①</sup>         | 8A   | 8A                                  | 8A                                  | 8A                                  | 0.5A                                |
| Short-circuit proof with power factor 1         | Line protection B16, 600A  | Line protection B16, 600A           | Line protection B16, 600A           | Line protection B16, 600A           | —                                   |
| Short-circuit proof with power factor 0.7...0.7 | Line protection B16, 900A  | Line protection B16, 900A           | Line protection B16, 900A           | Line protection B16, 900A           | —                                   |
| Mounting  | On top-hat rail to DIN 50022, 35 mm or screw mounting with ZB4-101-GF1 fixing brackets |                                     |                                     |                                     |                                     |
| Connection cables—solid                         | 0.2–4.0 mm <sup>2</sup> (AWG 22–12)  | 0.2–4.0 mm <sup>2</sup> (AWG 22–12) | 0.2–4.0 mm <sup>2</sup> (AWG 22–12) | 0.2–4.0 mm <sup>2</sup> (AWG 22–12) | 0.2–4.0 mm <sup>2</sup> (AWG 22–12) |
| Connection cables—flexible                      | 0.2–2.5 mm <sup>2</sup> (AWG 22–12)  | 0.2–2.5 mm <sup>2</sup> (AWG 22–12) | 0.2–2.5 mm <sup>2</sup> (AWG 22–12) | 0.2–2.5 mm <sup>2</sup> (AWG 22–12) | 0.2–2.5 mm <sup>2</sup> (AWG 22–12) |
| Degree of protection                            | IP 20  | IP 20                               | IP 20                               | IP 20                               | IP 20                               |
| RFI suppression                                 | EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4                                     |                                     |                                     |                                     |                                     |
| Ambient operating temperature                   | –25 to 55°C  | –25 to 55°C                         | –25 to 55°C                         | –25 to 55°C                         | –25 to 55°C                         |
| Transport and storage temperature               | –40 to 70°C  | –40 to 70°C                         | –40 to 70°C                         | –40 to 70°C                         | –40 to 70°C                         |
| Hazardous location                              | CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C                                 |                                     |                                     |                                     |                                     |

<sup>①</sup> Relay = 8A (10A to UL) with resistive load, 3A with inductive load. Transistor outputs = 0.5A/24 Vdc, maximum four outputs switchable in parallel.

## Dimensions

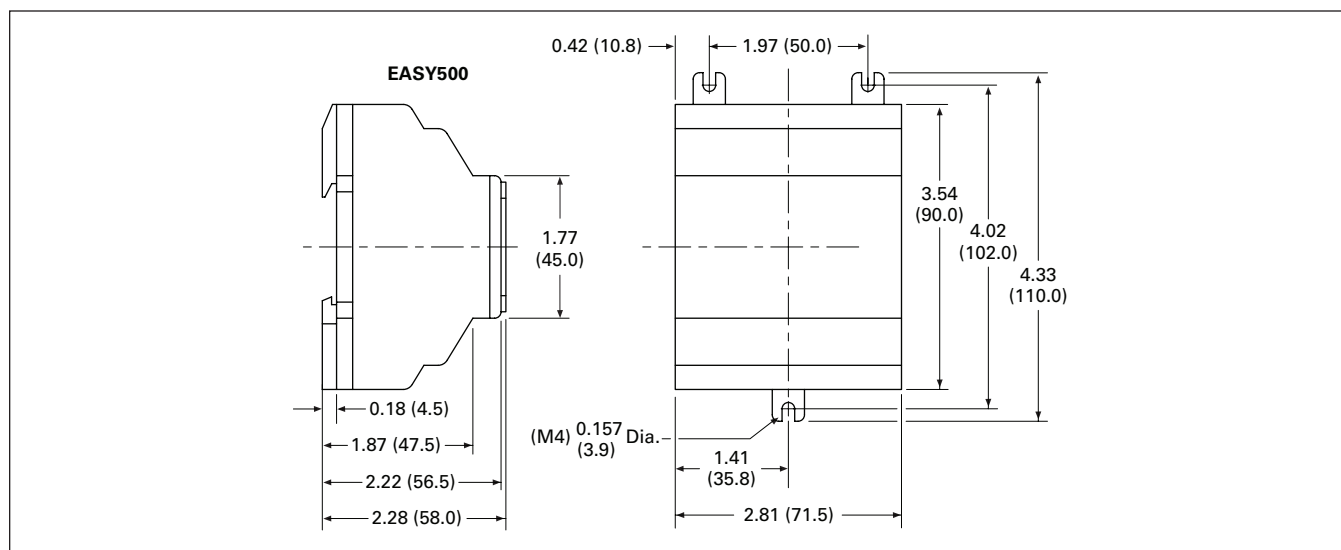
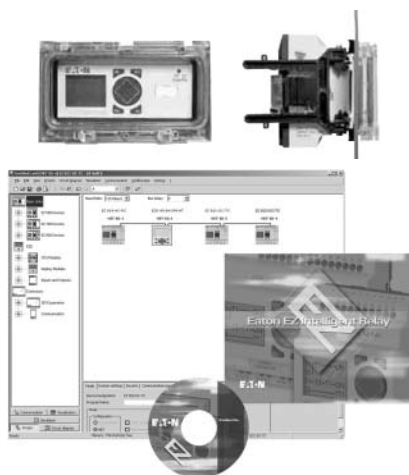


Figure 34.2-1. EASY500 Series, Drawing Number MD05013001E—Approximate Dimensions in Inches (mm)

## EASY/MFD Power Supplies, Accessories and Software



*EASY/MFD Power Supplies,  
Accessories and Software*

### General Description

#### EASY/MFD Power Supplies

12 Vdc and 24 Vdc power supplies for applications where only 100–240 Vac is available.

#### EASY/MFD Accessories

Memory modules, cables and other components to complete your automation solutions.

#### EASYSoft Software

The EASYSoft software is used to program all of the EASY and MFD controllers and displays. The Windows®-based software provides straightforward circuit diagram input and editing, and the diagrams can be displayed in the format desired. When EASY800 and MFD controllers are connected using EASY-NET, all connected devices can be accessed and their programs loaded from a single controller.

EASYSoft includes an integrated offline simulation tool that allows users to test a circuit diagram before commissioning.

### Product Selection

Table 34.2-18. EASY Power Supplies ①

| Description   | Catalog Number |
|---|----------------|
| 100–240 Vac input to 12 Vdc at 20 mA/24 Vdc at 250 mA | EASY200-POW    |
| 100–240 Vac input to 24 Vdc at 1.25A                  | EASY400-POW    |

① See Technical Data and Specifications on **Page 34.2-16** for more information.

### Accessories

Table 34.2-19. EASY/MFD Memory Storage Modules

| Description                            | Catalog Number |
|--|----------------|
| EASY500/700 32K memory storage module  | EASY-M-32K     |
| EASY800/MFD 256K memory storage module | EASY-M-256K    |

Table 34.2-20. EASY/MFD Cables and Connectors

| Description  | Catalog Number   |
|--|------------------|
| EASY500/700 to PC programming cable RS-232 from PC                             | EASY-PC-CAB      |
| EASY800/MFD to PC programming cable RS-232 from PC                             | EASY800-PC-CAB   |
| EASY500/700 to MFD-CP4 communication cable, 5m                                 | MFD-CP4-500-CAB5 |
| EASY800 to MFD-CP8 communication cable, 2m                                     | MFD-800-CAB      |
| EASY800 to MFD-CP8 communication cable, 5m                                     | MFD-800-CAB5     |
| EASY800 to MFD-CP4 communication cable, 5m                                     | MFD-CP4-800-CAB5 |
| EASY800/MFD EASY-NET cable, 0.3m networking cable                              | EASY-NT-30       |
| EASY800/MFD EASY-NET cable, 0.8m networking cable                              | EASY-NT-80       |
| EASY800/MFD EASY-NET cable, 1.5m networking cable                              | EASY-NT-150      |
| EASY800/MFD network termination resistor, 2/pack                               | EASY-NT-R        |
| EASY800/MFD EASY-NET cable (cable only, no connectors, see EASY-NT-RJ45), 100m | EASY-NT-CAB      |
| RJ45 network connectors for EASY-NET cable (EASY-NT-CAB), 10/pack              | EASY-NT-RJ45     |

Table 34.2-21. EASY/MFD Miscellaneous Parts

| Description   | Catalog Number    |
|---|-------------------|
| EASY500 relay simulator   | EASY412-DC-SIM-NA |
| EASY500 panel window  | SKF-FF4           |
| EASY700/800 panel window  | SKF-FF6           |
| EASY500/700/800 panel window mounting kit to front mount units                      | SKF-HA            |
| EASY/MFD panel mount brackets, 9/pack   | ZB4-101-GF1       |
| EASY/MFD grounding kit  | ZB4-102-KS1       |
| MFD display DIN rail mount kit  | MFD-TS144         |
| MFD display protective membrane cover   | MFD-XM-80         |
| MFD display protective plastic cover  | MFD-XS-80         |
| EASY/MFD six-channel high current input adapter ②                                   | EASY256-HCI       |
| EASY/MFD spare interface connector, base to expander                                | EASY-LINK-DS      |
| EASY starter kit (includes EASY512-DC-RC, EASY-PC-CAB, EASY412-DC-SIM-NA, EASYSoft) | EZSTARTKIT1       |

② See Technical Data and Specifications on **Page 34.2-16** for more information.

### EASY Software

Table 34.2-22. EASY/MFD Software

| Description                                      | Catalog Number |
|--|----------------|
| Programming software for EASY500/700/800 and MFD | EASYSOFT       |

Technical Data and Specifications

Table 34.2-23. EASY Power Supplies

| Type                                    | EASY200-POW  | EASY400-POW  |
|---|--|--|
| Supply voltage                          | 100–240 Vac  | 100–240 Vac  |
| Maximum range                           | 85–264 Vac   | 85–264 Vac   |
| Output voltage                          | 24 Vdc (±3%)   | 24 Vdc (±3%)                                       |
| Output current (rated value)            | 0.25A  | 1.25A  |
| Overcurrent limitation form             | 0.3A   | 1.4A   |
| Short-circuit proof (secondary)         | Yes  | Yes  |
| Overload proof                          | Yes  | Yes  |
| Potential isolation (primary/secondary) | Yes, SELV, (to EN 600950, VDE 805)   | Yes, SELV, (to EN 600950, VDE 805)                 |
| Others                                  | Additional output voltage 12 DC, 20 mA   | Additional output voltage 12 DC, 20 mA             |
| Connection cables—solid                 | 0.2–4.0 mm <sup>2</sup> (AWG 22-12)  | 0.2–4.0 mm <sup>2</sup> (AWG 22-12)                |
| Connection cables—flexible              | 0.2–2.5 mm <sup>2</sup> (AWG 22-12)  | 0.2–2.5 mm <sup>2</sup> (AWG 22-12)                |
| Degree of protection                    | IP 20  | IP 20  |
| RFI suppression                         | EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4                                     | EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4 |
| Ambient operating temperature           | –25° to 55°C   | –25° to 55°C                                       |
| Transport and storage temperature       | –40° to 70°C   | –40° to 70°C                                       |
| Mounting                                | On top-hat rail to DIN 50022, 35 mm or screw mounting with ZB4-101-GF1 fixing brackets |  |

Wiring Diagram

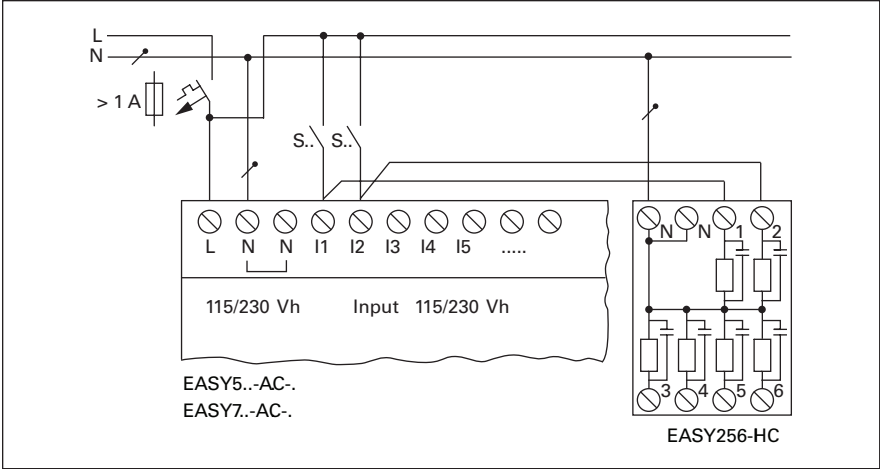


Figure 34.2-13. EASY256-HCI

## **PRESSURE SWITCHES**



## Important Points!

Product must be maintained and installed in strict accordance with the National Electrical Code and Dwyer product catalog and instruction bulletin. Failure to observe this warning could result in serious injuries or damages.

For hazardous area applications involving such things as (but not limited to) ignitable mixtures, combustible dust and flammable materials, use an appropriate explosion-proof enclosure or intrinsically safe interface device.

The pressure and temperature limitations shown on the individual catalog pages and drawings for the specified flow switches must not be exceeded. These pressures and temperatures take into consideration possible system surge pressures/temperatures and their frequencies.

Selection of materials for compatibility with the media is critical to the life and operation of Dwyer products. Take care in the proper selection of materials of construction, particularly wetted materials.

Life expectancy of switch contacts varies with applications. Contact Dwyer if life cycle testing is required.

Ambient temperature changes do affect switch set points, since the specific gravity of a liquid can vary with temperature.

Dwyer Products have been designed to resist shock and vibration; however, shock and vibration should be minimized.

Filter liquid media containing particulate and/or debris to ensure the proper operation of our products.

Electrical entries and mounting points in an enclosed tank may require liquid/vapor sealing.

Dwyer Products must not be field-repaired.

Physical damage sustained by the product may render it unserviceable.



## A2 Pressure Switches

### Instruction Bulletin No. 204117

### Installation

To install the switches, use a suitable wrench on the port and plumb into place with the proper sealant. For electrical wiring, refer to wiring codes on the next page and to the specification sheet for the switch ratings. For low DC loads (<50 mA, TTL logic) use switches with gold contacts. All the switches are adjustable unless they were ordered with the IP68 submersible option, in which case they are factory set and not field adjustable. All switches are maintenance-free.

### Adjusting the Set point

- 1) Using a 1/8 inch Allen (Hex) wrench, adjust **clockwise to increase** the set point and **counterclockwise to lower** the set point. (Adjustments are done while applying a known pressure and monitoring the switch's state.)
- 2) After verifying the set point re-assemble the switch.

DWYER INSTRUMENTS, INC.

P.O. BOX 373 MICHIGAN CITY, INDIANA 46361, U.S.A.

Phone: 219/879-8000

Fax: 219/872-9057

Lit-By Fax: 888/891-4963

www.dwyer-inst.com

e-mail: info@dwyer-inst.com

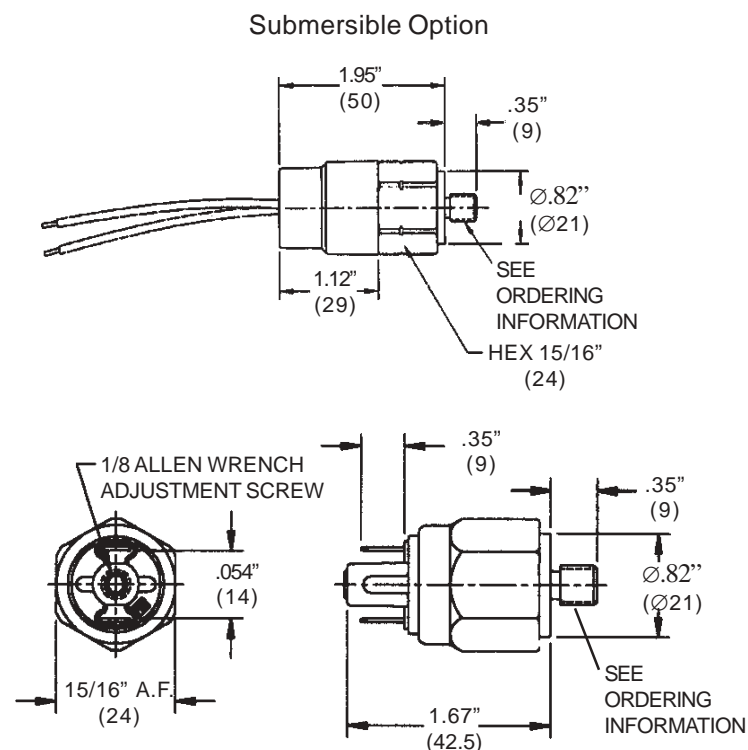
## Specifications

|                               |  |
|-------------------------------|--|
| <b>Process Temperature</b>    | -4°F to +250°F (-20°C to +120°C)   |
| <b>Ambient Temperature</b>    | -40°F to +250°F (-40°C to +120°C)  |
| <b>Switch</b>                 | SPST, 100 VA, 42V max. (>2 million cycles @ 1,000 psi, max. 200 cycles/min.) |
| <b>Approvals</b>              | CE   |
| <b>Repeatability</b>          | 5% of Highest Set Point @ 70°F (20°C)  |
| <b>Wetted Parts</b>           |  |
| <b>Diaphragm</b>              | Kapton®  |
| <b>Fitting</b>                | Brass  |
| <b>Electrical Termination</b> | 6.3mm (1/4") Spade or Screw Terminals  |
| <b>Process Fitting</b>        | G or NPT 1/4"(optional 1/8")   |
| <b>Deadband</b>               | 1-2 psi  |
| <b>Proof Pressure</b>         | 500 psi (34.5 bar)   |
| <b>Weight, Approximate</b>    | 0.14 lbs. (0.06 kg)  |

The pressure switch is designed and manufactured in accordance with Sound Engineering Practice as defined by the Pressure Equipment Directive 97/23/EC. This pressure switch must not be used as a "safety accessory" as defined by the Pressure Equipment, Article 1, Paragraph 2.1.3.

The CE Mark on the unit does not relate to the Pressure Equipment Directive.

## Dimensions



## Maintenance/Repair

Regular maintenance of the total system is recommended to assure sustained optimum performance. These devices are not field repairable and should be returned to the factory if recalibration or other service is required. After first obtaining a Returned Goods Authorization (RGA) number, send the unit freight prepaid to the following. Please include a clear description of the problem plus any application information available.

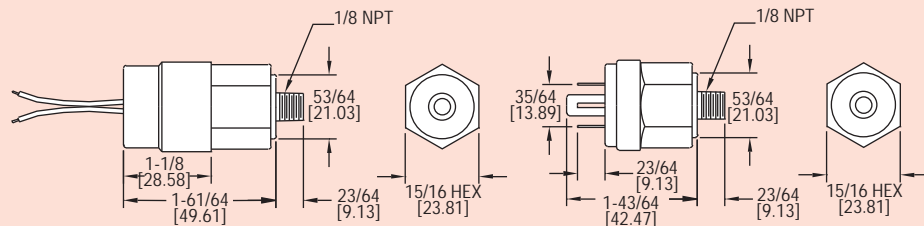
Dwyer Instruments, Inc.  
Attn: Repair Department  
102 Highway 212  
Michigan City, IN 46360



Series  
A2

# Subminiature Pressure Switch

## Field Adjustable, Submersible Models



**Designed for OEM applications**, the Series A2 is economical and is equipped with high proof pressure capabilities for demanding applications. The A2 is available with either spade terminals or flying leads (submersible). Switches with spade terminals can be easily adjusted in the field.

### SPECIFICATIONS

**Service:** Compatible liquids and gases.

**Wetted Materials:** Polyimide film and brass.

**Temperature Limits:** -40 to 250°F (-40 to 121°C).

**Pressure Limits:** 500 psi (34 bar).

**Enclosure Rating:** IP68 (submersible models only).

**Repeatability:** ±5% of highest set point.

**Switch Type:** SPST, 100VA, 42V.

**Electrical Connection:** 1/4" (6.3 mm) spade terminals or flying leads.

**Process Connection:** 1/8" male NPT.

**Weight:** 0.14 lb (0.06 kg).

**Deadband:** 1-2 psi (0.07-0.14 bar).

**Agency Approvals:** CE.

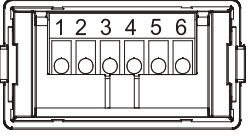
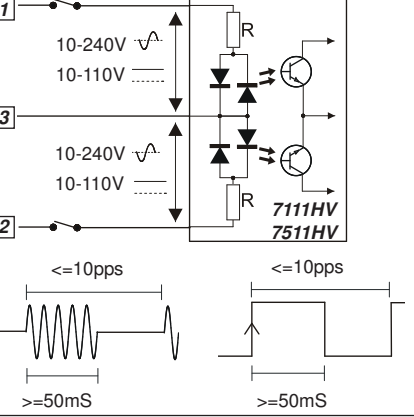
| Model     | Range psi (bar) | Electrical Connection      | NO/NC | Model     | Range psi (bar)   | Electrical Connection      | NO/NC |
|-----------|-----------------|----------------------------|-------|-----------|-------------------|----------------------------|-------|
| A2-2801   | 5-25 (.48-1.72) | Spade Terminals            | NO    | A2-3801   | 20-60 (1.4-4.1)   | Spade Terminals            | NO    |
| A2-28032* | 5-25 (.48-1.72) | Flying Leads (Submersible) | NO    | A2-38032* | 20-60 (1.4-4.1)   | Flying Leads (Submersible) | NO    |
| A2-2811   | 5-25 (.48-1.72) | Spade Terminals            | NC    | A2-3811   | 20-60 (1.4-4.1)   | Spade Terminals            | NC    |
| A2-28132* | 5-25 (.48-1.72) | Flying Leads (Submersible) | NC    | A2-38132* | 20-60 (1.4-4.1)   | Flying Leads (Submersible) | NC    |
|           |                 |                            |       | A2-4801   | 50-150 (3.5-10.3) | Spade Terminals            | NO    |
|           |                 |                            |       | A2-48032* | 50-150 (3.5-10.3) | Flying Leads (Submersible) | NO    |
|           |                 |                            |       | A2-4811   | 50-150 (3.5-10.3) | Spade Terminals            | NC    |
|           |                 |                            |       | A2-48132* | 50-150 (3.5-10.3) | Flying Leads (Submersible) | NC    |

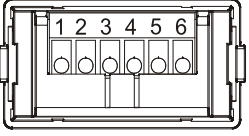
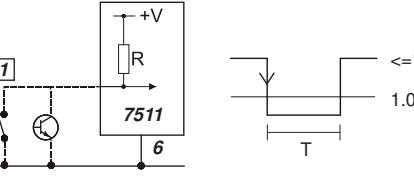
\* Submersible models are not field adjustable. Set point must be given at time of order.

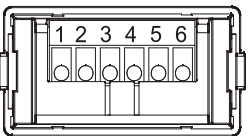
## **RUN-TIME COUNTERS**





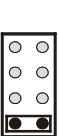
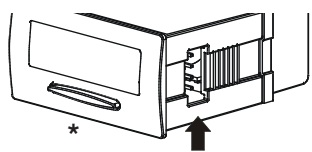
| English  | Deutsche  | Français  | Español  | Italiano  | Specification   |
|--|---|---|--|---|---|
| 7111HV   |   |   |  |   |   |
|  | 1 High Voltage Count Input<br>2 High Voltage External Reset Input<br>3 Common for pins 1 & 2<br>4 Direction Input<br>5 External power for backlight<br>6 0V, Common for pins 4 & 5  | 1 Hochspannungs-Zähleingang<br>2 Externer Hochspannungs-Rücksetzeingang<br>3 Gemeinsamer Anschluss für Stift 1 & 2<br>4 Eingang Zählrichtung<br>5 Externe Versorgung für Hintergrundbeleuchtung<br>6 0V, Gemeinsamer Anschluss für Stift 4 & 5        | 1 Entrée comptage haute tension<br>2 Entrée externe haute tension de remise à zéro<br>3 Commun pour bornes 1 & 2<br>4 Entrée de sens de comptage<br>5 Alimentation externe pour rétroéclairage<br>6 0V, Commun pour bornes 4 & 5                                 | 1 Entrada de conteo de alto voltaje<br>2 Entrada de rearme externo de alto voltaje<br>3 Común para clavijas 1 y 2<br>4 Entrada de dirección<br>5 Alimentación externa para luz de fondo<br>6 0V, Común para clavijas 4 y 5                                  | 1 Ingresso conteggio alta tensione<br>2 Ingresso di reset esterno alta tensione<br>3 Comune per pin 1 e 2<br>4 Ingresso di direzione<br>5 Alimentazione esterna per retroilluminazione<br>6 0V, Comune per pin 4 e 5                              |
|  | <b>High Voltage Count Input</b> <ul style="list-style-type: none"> <li>Opto-isolated</li> <li>R = internal resistor 50KΩ</li> <li>10 - 240V AC ±10%</li> <li>10 - 110V DC ±10%</li> <li>maximum 10 pulses per second, minimum 50mS</li> </ul> | <b>Hochspannungs-Zähleingang</b> <ul style="list-style-type: none"> <li>Optoisoliert</li> <li>R = interne Widerstände 50 KΩ</li> <li>10 - 240 V c.a. ±10%</li> <li>10 - 110 VDC ± 10%</li> <li>Maximum 10 Pulse pro Sekunde, Minimum 50 ms</li> </ul> | <b>Entrée comptage haute tension</b> <ul style="list-style-type: none"> <li>Photocouplé</li> <li>R = résistance interne 50 KΩ</li> <li>10 - 240 V c.a. ±10 %</li> <li>10 - 110 V c.c. ±10 %</li> <li>maximum 10 impulsions par seconde, minimum 50 mS</li> </ul> | <b>Entrada de conteo de alto voltaje</b> <ul style="list-style-type: none"> <li>Optoaislado</li> <li>R = resistencia interna 50 KΩ</li> <li>10 - 240 V CA ±10%</li> <li>10 - 110 V CC ±10%</li> <li>máximo 10 impulsos por segundo, mínimo 50 mS</li> </ul> | <b>Ingresso conteggio alta tensione</b> <ul style="list-style-type: none"> <li>Optoisolato</li> <li>R = Resistore interno 50 KΩ</li> <li>10 - 240 V CA ±10%</li> <li>10 - 110 V CC ±10%</li> <li>Max 10 impulsi al secondo, min. 50 mS</li> </ul> |
|  | <b>High Voltage External Reset Input</b> <ul style="list-style-type: none"> <li>Opto-isolated</li> <li>R = internal resistor 50KΩ</li> <li>10 - 240V AC ±10%</li> <li>10 - 110V DC ±10%</li> <li>minimum 50mS</li> </ul>                      | <b>Externer Hochspannungs-Rücksetzeingang</b> <ul style="list-style-type: none"> <li>Optoisoliert</li> <li>R = interne Widerstände 50 KΩ</li> <li>10 - 240 VAC ± 10%</li> <li>10 - 110 VDC ± 10%</li> <li>Minimum 50 ms</li> </ul>                    | <b>Entrée externe haute tension de remise à zéro</b> <ul style="list-style-type: none"> <li>Photocouplé</li> <li>R = résistance interne 50 KΩ</li> <li>10 - 240 V c.a. ±10 %</li> <li>10 - 110 V c.c. ±10 %</li> <li>minimum 50 mS</li> </ul>                    | <b>Entrada de rearme externo de alto voltaje</b> <ul style="list-style-type: none"> <li>Optoaislado</li> <li>R = resistencia interna 50 KΩ</li> <li>10 - 240 V CA ±10%</li> <li>10 - 110 V CC ±10%</li> <li>mínimo 50 mS</li> </ul>                         | <b>Ingresso di reset esterno alta tensione</b> <ul style="list-style-type: none"> <li>Optoisolato</li> <li>R = Resistore interno 50 KΩ</li> <li>10 - 240 V CA ±10%</li> <li>10 - 110 V CC ±10%</li> <li>Min. 50 mS</li> </ul>                     |
| 4<br>5<br>6  | <b>Direction Input</b> <ul style="list-style-type: none"> <li>see 7111, overleaf</li> </ul> <b>External Supply for backlight</b> <ul style="list-style-type: none"> <li>see 7111, overleaf</li> </ul>   | <b>Eingang Zählrichtung</b> <ul style="list-style-type: none"> <li>siehe 7111, umseitig</li> </ul> <b>Externe Versorgung für Hintergrundbeleuchtung</b> <ul style="list-style-type: none"> <li>siehe 7111, umseitig</li> </ul>                        | <b>Entrée de sens de comptage</b> <ul style="list-style-type: none"> <li>voir 7111, sur l'autre page</li> </ul> <b>Alimentation externe pour rétroéclairage</b> <ul style="list-style-type: none"> <li>voir 7111, sur l'autre page</li> </ul>                    | <b>Entrada de dirección</b> <ul style="list-style-type: none"> <li>véase 7111, en el reverso</li> </ul> <b>Alimentación externa para luz de fondo</b> <ul style="list-style-type: none"> <li>véase 7111, en el reverso</li> </ul>                           | <b>Ingresso di direzione</b> <ul style="list-style-type: none"> <li>vedere 7111, a tergo</li> </ul> <b>Alimentazione esterna per retroilluminazione</b> <ul style="list-style-type: none"> <li>vedere 7111, a tergo</li> </ul>                    |

| 7511   |  |  |  |  |   |
|--|--|--|--|--|---|
|   |  |  |  |  |   |
|  | <b>Timing Input</b> <ul style="list-style-type: none"> <li>sink signal (NPN)</li> <li>R = internal resistor 3.3MΩ</li> <li>maximum 18V, threshon 1V</li> <li>negative edge trigger</li> <li>Seconds, Minutes - Seconds: T = minimum 1 second</li> <li>Hours - 1/100, Hours - Minutes: T = minimum 6 seconds</li> </ul> | <b>Zeitzähleingang</b> <ul style="list-style-type: none"> <li>Sink-Signal (NPN)</li> <li>R = interne Widerstände 3,3 MΩ</li> <li>Maximum 18 V, Schwelle 1 V</li> <li>negative Flankensteuerung</li> <li>Sekunden, Minuten - Sekunden: T = Minimum 1 Sekunde</li> <li>Stunden - 1/100, Stunden - Minuten: T = Minimum 6 Sekunden</li> </ul> | <b>Entrée comptage temps</b> <ul style="list-style-type: none"> <li>signal capteur (NPN)</li> <li>R = résistance interne 3,3 MΩ</li> <li>maximum 18 V, seuil 1 V</li> <li>déclenchement par impulsion négative</li> <li>Secondes, Minutes - Secondes : T = minimum 1 seconde</li> <li>Heures - 1/100, Heures - Minutes : T = minimum 6 secondes</li> </ul> | <b>Entrada de tiempo</b> <ul style="list-style-type: none"> <li>señal de carga (NPN)</li> <li>R = resistencia interna 3,3 MΩ</li> <li>máximo 18 V, umbral 1 V</li> <li>disparo por borde negativo</li> <li>Segundos, minutos - segundos: T = mínimo 1 segundo</li> <li>Horas - 1/100, Horas - minutos T = mínimo 6 segundos</li> </ul> | <b>Ingresso timer</b> <ul style="list-style-type: none"> <li>segnale di pozzetto (NPN)</li> <li>R = Resistore interno 3,3 MΩ</li> <li>massimo 18 V, limite 1 V</li> <li>circuito d'ingresso a impulso negativo</li> <li>Secondi, minuti - Secondi: T = min. 1 secondo</li> <li>Ore - 1/100, Ore - Minuti: T = min. 6 secondi</li> </ul> |
| 3<br>4<br>5<br>6   | <b>External Reset Input</b> <ul style="list-style-type: none"> <li>see 7111, overleaf</li> </ul> <b>Direction Input</b> <ul style="list-style-type: none"> <li>see 7111, overleaf</li> </ul>   | <b>Externer Rücksetzeingang</b> <ul style="list-style-type: none"> <li>véase 7111, sur l'autre page</li> </ul> <b>Eingang Zählrichtung</b> <ul style="list-style-type: none"> <li>siehe 7111, umseitig</li> </ul>  | <b>Entrée externe de remise à zéro</b> <ul style="list-style-type: none"> <li>voir 7111, sur l'autre page</li> </ul> <b>Entrée de sens de comptage</b> <ul style="list-style-type: none"> <li>voir 7111, sur l'autre page</li> </ul>   | <b>Entrada de rearme externo</b> <ul style="list-style-type: none"> <li>véase 7111, en el reverso</li> </ul> Entrada de dirección<br>véase 7111, en el reverso   | <b>Ingresso di reset esterno</b> <ul style="list-style-type: none"> <li>vedere 7111, a tergo</li> </ul> <b>Ingresso di direzione</b> <ul style="list-style-type: none"> <li>vedere 7111, a tergo</li> </ul>   |
| 5<br>6   | <b>External Supply for backlight</b> <ul style="list-style-type: none"> <li>see 7111, overleaf</li> </ul>  | <b>Externe Versorgung für Hintergrundbeleuchtung</b> <ul style="list-style-type: none"> <li>siehe 7111, umseitig</li> </ul>  | <b>Alimentation externe pour rétroéclairage</b> <ul style="list-style-type: none"> <li>voir 7111, sur l'autre page</li> </ul>  | <b>Alimentación externa para luz de fondo</b> <ul style="list-style-type: none"> <li>véase 7111, en el reverso</li> </ul>  | <b>Alimentazione esterna per retroilluminazione</b> <ul style="list-style-type: none"> <li>vedere 7111, a tergo</li> </ul>  |

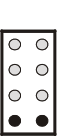
| 7511HV   |   |   |   |   |   |
|--|---|---|---|---|---|
|  |   |   |   |   |   |
| 1<br>3<br>2<br>4<br>5<br>6   | <b>High Voltage Timing Input</b> <ul style="list-style-type: none"> <li>T: see 7511, above</li> </ul> HV: see 7111HV, above<br><b>High Voltage External Reset Input</b> <ul style="list-style-type: none"> <li>see 7111HV, above</li> </ul> | <b>Hochspannungs-Zeitzähleingang</b> <ul style="list-style-type: none"> <li>T: siehe 7511, oben</li> </ul> Hochspannung: siehe 7111HV, oben<br><b>Externer Hochspannungs-Rücksetzeingang</b> <ul style="list-style-type: none"> <li>siehe 7111HV, oben</li> </ul> | <b>Entrée comptage temps haute tension</b> <ul style="list-style-type: none"> <li>T : voir 7511, ci-dessus. HV : voir 7111HV</li> </ul> <b>Entrée externe haute tension de remise à zéro</b> <ul style="list-style-type: none"> <li>voir 7111HV, ci-dessus</li> </ul> | <b>Entrada de tiempo de alto voltaje</b> <ul style="list-style-type: none"> <li>T: véase 7511, arriba.</li> </ul> HV: véase 7111HV, arriba<br><b>Entrada de rearme externo de alto voltaje</b> <ul style="list-style-type: none"> <li>véase 7111HV, arriba</li> </ul> | <b>Ingresso timer alta tensione</b> <ul style="list-style-type: none"> <li>T: vedere 7511, sopra</li> </ul> HV: vedere 7111HV, sopra<br><b>Ingresso di reset esterno alta tensione</b> <ul style="list-style-type: none"> <li>vedere 7111HV, sopra</li> </ul> |
| 4<br>5<br>6  | <b>Direction Input</b> <ul style="list-style-type: none"> <li>see 7111, overleaf</li> </ul> <b>External Supply for backlight</b> <ul style="list-style-type: none"> <li>see 7111, overleaf</li> </ul>                                       | <b>Eingang Zählrichtung</b> <ul style="list-style-type: none"> <li>see 7111, umseitig</li> </ul> <b>Externe Versorgung für Hintergrundbeleuchtung</b> <ul style="list-style-type: none"> <li>siehe 7111, umseitig</li> </ul>                                      | <b>Entrée de sens de comptage</b> <ul style="list-style-type: none"> <li>voir 7111, sur l'autre page</li> </ul> <b>Alimentation externe pour rétroéclairage</b> <ul style="list-style-type: none"> <li>voir 7111, sur l'autre page</li> </ul>                         | <b>Entrada de dirección</b> <ul style="list-style-type: none"> <li>véase 7111, en el reverso</li> </ul> <b>Alimentación externa para luz de fondo</b> <ul style="list-style-type: none"> <li>véase 7111, en el reverso</li> </ul>                                     | <b>Ingresso di direzione</b> <ul style="list-style-type: none"> <li>vedere 7111, a tergo</li> </ul> <b>Alimentazione esterna per retroilluminazione</b> <ul style="list-style-type: none"> <li>vedere 7111, a tergo</li> </ul>                                |

## 7511 , 7511HV Configuration, Konfiguration, Configuration, Configuración, Configurazione

Timing range, Zeitzählerbereich, Base de temps, Rango de temporizador, Gamme di timer



\*  
Front panel reset enabled  
Frontblende-Rücksetzung aktiviert  
Remise à zéro de la face avant activée  
Rearme de panel frontal habilitado  
Reset pannello anteriore abilitato



\*  
Front panel reset disabled  
Frontblende-Rücksetzung deaktiviert  
Remise à zéro de la face avant désactivée  
Rearme de panel frontal inhabilitado  
Reset pannello anteriore disabilitato



99999999  
Seconds  
Sekunden  
Secondes  
Segundos  
Secondi



99999-59  
Minutes - Seconds  
Minuten - Sekunden  
Minutes - Secondes  
Minutos - Segundos  
Minuti - Secondi



99999-99  
Hours - 1/100  
Stunden - 1/100  
Heures - 1/100  
Horas - 1/100  
Ore - 1/100



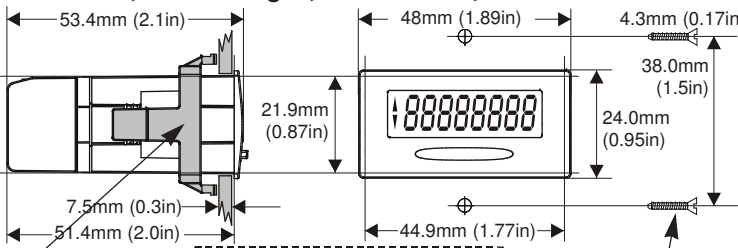
99999-59  
Hours - Minutes  
Stunden - Minuten  
Heures - Minutes  
Horas - Minutos  
Ore - Minuti

|   |  |
|---|--|
| <b>Connections</b><br>Finger-proof screw connections for wires up to 1.5mm²   |  |
| <b>Operating temperature</b><br>-10°C to +60°C  | <b>Storage temperature</b><br>-20°C to +60°C |
| <b>Display</b><br>8 digit black LCD, 9mm characters, leading zero blanking, backlight requires external supply                        |  |
| <b>7111 Count Range</b><br>99999999 - rollover to 0   |  |
| <b>7511 Timing Range</b><br>See 'Timing Range', below   |  |
| <b>Spezifikation</b>  |  |
| <b>Batterie</b><br>Nicht ersetzbare Lithiumbatterie, Nutzungsdauer mindestens 10 Jahre bei 20°C                                       |  |
| <b>Anzeige</b><br>LCD, 8-stellig, Zeichenhöhe 9 mm, führende Nullen ausgeblendet, Hintergrundbeleuchtung erfordert externe Versorgung |  |
| <b>7111 Zählbereich</b><br>99999999 - Überlauf zu 0   |  |
| <b>7511 Zeitzählerbereich</b><br>Siehe 'Zeitzählerbereich', unten   |  |
| <b>Anschlüsse</b><br>Berührungssichere Schraubanschlüsse für Kabel bis zu 1,5 mm²   |  |
| <b>Betriebstemperatur</b><br>-10°C bis +60°C  | <b>Lagertemperatur</b><br>-20°C bis +60°C    |
| <b>Betriebshöhe</b><br>Bis zu 2000 m  |  |
| <b>Relative Luftfeuchtigkeit</b><br>80% max. bis 31°C, abnehmend um max. 50% bis 40°C   |  |
| <b>Dichtung</b> IP65/NEMA4X: <b>Vor Gebrauch Folie von Selbstklebedichtung entfernen!</b><br>Schutzklasse II, Entstörgrad 2 (IEC 64)  |  |

|  |                                       |
|--|---------------------------------------|
| <b>Caractéristiques</b>  |                                       |
| <b>Pile</b><br>Pile au lithium non remplaçable. Durée de vie prévue 10 ans à 20°C  |                                       |
| <b>Afficheur</b><br>Afficheur à cristaux liquides noirs à 8 chiffres, caractères 9 mm, remise à zéro de conduction, le rétroéclairage nécessite alimentation externe |                                       |
| <b>Base de comptage 7111</b><br>99999999 - décroissant jusqu'à 0   |                                       |
| <b>Base de temps 7511</b><br>Voir 'Base de temps' ci-dessous   |                                       |
| <b>Raccordements</b><br>Connexions à vis protégé-doigts pour fil jusqu'à 1,5 mm².  |                                       |
| <b>Température de fonctionnement</b><br>-10°C à +60°C  | <b>..de stockage</b><br>-20°C à +60°C |
| <b>Altitude</b><br>Jusqu'à 2000 m  |                                       |
| <b>Humidité relative</b><br>80% max jusqu'à 31°C ; 50% max à 40°C  |                                       |
| <b>Etanchéité</b> IP65/NEMA4X : <b>Avant utilisation, retirer le film du joint d'étanchéité fourni</b><br>Catégorie surtension II, niveau de pollution 2 (IEC 64)    |                                       |

|   |  |
|---|--|
| <b>Especificación</b>   |  |
| <b>Pila</b><br>Pila de litio no reemplazable, vida útil prevista 10 años a 20º C  |  |
| <b>Pantalla</b><br>LCD con 8 dígitos negros, caracteres de 9 mm, se borran los ceros a la izquierda, luz de fondo requiere alimentación externa                                 |  |
| <b>7111 Rango de conteo</b><br>99999999 - vuelve a 0  |  |
| <b>7511 Rango de tiempo</b><br>Véase "Rango de tiempo", más abajo   |  |
| <b>Conexiones</b><br>Conexiones tornillo a prueba de dedos para cables de hasta 1,5 mm²   |  |
| <b>Temperatura de funcionamiento</b><br>-10° C a +60° C   | <b>..almacenaje</b><br>-20° C a +60° C |
| <b>Altitud</b><br>Hasta 2000 m  |  |
| <b>Humedad relativa</b><br>Máx. 80% hasta 31º C, disminuyendo a 50% máx. a 40º C  |  |
| <b>Estanqueidad</b> IP65/NEMA4X: <b>RETIRAR la película protectora de la junta autoadhesiva antes de su uso</b> Categoría II de sobrevoltaje, grado de contaminación 2 (IEC 64) |  |

|   |  |
|---|--|
| <b>Specifiche</b>   |  |
| <b>Batteria</b><br>Batteria al litio non sostituibile, durata prevista 10 anni a 20°C   |  |
| <b>Visualizzazione</b><br>LCD nero a 8 cifre, caratteri da 9 mm, soppressione degli zero non significativi, retroilluminazione ad alimentazione esterna                 |  |
| <b>Gamme di conteggio 7111</b><br>99999999 - ritorno a 0  |  |
| <b>Gamme di conteggio 7511</b><br>Vedere 'Gamme di timer', sotto  |  |
| <b>Collegamenti</b><br>Collegamenti a vite a prova di dita per fili metallici fino a 1,5 mm².   |  |
| <b>Temperatura di funzionamento</b><br>Da -10°C a +60°C   | <b>..di immagazzinamento</b><br>Da -20°C a +60°C |
| <b>Altitudine</b><br>Fino a 2000 m  |  |
| <b>Umidità relativa</b><br>Max 80% fino a 31°C, a scendere fino al 50% max a 40°C   |  |
| <b>Tenuta</b> IP65/NEMA4X: <b>prima dell'uso, rimuovere la pellicola dalla guarnizione autoadesiva.</b> Categoria di sovratensione II, grado di inquinamento 2 (IEC 64) |  |

|   |  |
|---|--|
| <b>Dimensions, Abmessungen, Dimensioni</b>  |  |
|    |  |
| <ul style="list-style-type: none"> <li>Fixing Clip</li> <li>Befestigungsklammer</li> <li>Clip de fixation</li> <li>Accesorio de fijación</li> <li>Clip di fissaggio</li> </ul>              | <ul style="list-style-type: none"> <li>Panel cutout • Abmessungen der Aussparung für frontblende</li> <li>Decoupé de face avant</li> <li>Tamaño del recorte del panel</li> <li>Dimensioni apertura pannello</li> </ul> |
| <ul style="list-style-type: none"> <li>Screw-fixed bezel</li> <li>Frontrahmen mit Schraubenbefestigung</li> <li>Cadre à vis • Marco fijado con tornillos</li> <li>Cornice a vite</li> </ul> |  |

|   |  |
|---|--|
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| Innovative Design Technologies Sdn Bhd, Lot 5881, Lorong IKS Bukit Minyak Satu, Taman Perindustrian IKS,<br>14000 Bukit Tengah, Penang, Malaysia<br>Tel +60 (0) 4 5015700 Fax +60 (0) 4 5015701<br>email: sales.malaysia@IDTworld.com |  |
| Trumeter Deutschland, Postfach 1215, D-71141, Steinbronn, Deutschland<br>Tel: +49 (0)7157 20801 Fax: +49 (0)7157 20813<br>email: verkauf.deutschland@trumeter.com   |  |

http://www.trumeter.com



**ATTACHMENT 6**

**COMPRESSOR MANUFACTURE TEST DATA**

**Pressure Performance Test - Unit #1**  
**2660CE37-XXX**

Test No: T06-0298  
 Tech: Richard Rabitoy  
 Date: 4/27/2006

**UNIT #1**

TEST NO: T06-0298

Date: 4/27/2006  
 Tech: Richard Rabitoy

**PRESSURE PERFORMANCE TEST**  
**2660CE37-XXX**

**LINE TEST SPEC DATA**

|          |       |             |           |       |
|----------|-------|-------------|-----------|-------|
| VOLTAGE  | 104.0 | VOLTS       | Panel #   | 10    |
| FREQ     | 60    | Hz          |           |       |
| PRESSURE | 15.0  | PSI         | CAP mfd   | 15    |
| MAX VAC  | 0.0   | -3% in Hg   |           |       |
| FLOW     | 3.53  | 2.89 SCFM   | CAP volts | n/a   |
| CURRENT  | 3.49  | 4.12 AMPS   |           |       |
| POWER    | 345.6 | 407.8 WATTS | TUBE TEMP | 28    |
| SPEED    | 1702  | RPM         |           |       |
|          |       |             | BAROMETER | 29.35 |

| VOLTS<br>AC | PRESSURE<br>PSIG | FLOW P<br>SCFM | VACUUM<br>in HG | FLOW V<br>SCFM | AMPS<br>AC | POWER<br>WATTS | SPEED<br>RPM | TEMP<br>Pres. | TEMP<br>Vac. |
|-------------|------------------|----------------|-----------------|----------------|------------|----------------|--------------|---------------|--------------|
| 104.0       | 15.0             | 3.53           | 0.0             | 0.00           | 3.49       | 345.6          | 1702         | 28            | 26           |
|             |                  |                |                 |                |            |                |              |               |              |
| 127.1       | 6.7              | 3.89           | 0.0             | 0.00           | 3.45       | 326.5          | 1753         | 28            | 26           |
| 127.1       | 10.0             | 3.76           | 0.0             | 0.00           | 3.59       | 355.7          | 1745         | 28            | 26           |
| 127.0       | 15.0             | 3.55           | 0.0             | 0.00           | 3.79       | 393.6          | 1734         | 29            | 26           |
| 127.0       | 20.0             | 3.38           | 0.0             | 0.00           | 3.97       | 424.6          | 1725         | 29            | 26           |
| 126.9       | 25.0             | 3.19           | 0.0             | 0.00           | 4.14       | 452.9          | 1716         | 29            | 26           |
| 127.0       | 30.0             | 3.01           | 0.0             | 0.00           | 4.27       | 474.3          | 1710         | 29            | 26           |
|             |                  |                |                 |                |            |                |              |               |              |
| 115.0       | 6.3              | 3.76           | 0.0             | 0.00           | 2.84       | 278.6          | 1746         | 30            | 26           |
| 115.0       | 10.0             | 3.64           | 0.0             | 0.00           | 3.08       | 312.1          | 1735         | 31            | 26           |
| 115.0       | 15.0             | 3.45           | 0.0             | 0.00           | 3.39       | 353.6          | 1721         | 31            | 26           |
| 115.1       | 20.0             | 3.28           | 0.0             | 0.00           | 3.68       | 390.1          | 1708         | 31            | 26           |
| 115.1       | 25.0             | 3.11           | 0.0             | 0.00           | 3.93       | 421.4          | 1696         | 32            | 26           |
| 115.1       | 30.0             | 2.93           | 0.0             | 0.00           | 4.14       | 446.4          | 1686         | 32            | 26           |
|             |                  |                |                 |                |            |                |              |               |              |
| 104.0       | 6.3              | 3.71           | 0.0             | 0.00           | 2.63       | 254.4          | 1735         | 33            | 26           |
| 104.0       | 10.0             | 3.59           | 0.0             | 0.00           | 2.97       | 291.3          | 1719         | 33            | 26           |
| 104.0       | 15.0             | 3.39           | 0.0             | 0.00           | 3.41       | 338.1          | 1699         | 34            | 26           |
| 103.9       | 20.0             | 3.21           | 0.0             | 0.00           | 3.77       | 375.9          | 1682         | 34            | 26           |
| 104.0       | 25.0             | 3.04           | 0.0             | 0.00           | 4.15       | 414.2          | 1662         | 34            | 26           |
| 103.9       | 30.0             | 2.85           | 0.0             | 0.00           | 4.47       | 446.3          | 1643         | 35            | 26           |

## **ATTACHMENT 7**

### **SOLAR ARRAY SIZING CALCULATIONS**

[illegible]

# **PV SYSTEM WORKSHEET** **Page 2 - Power System**

|                                  |  |           |                                    |  |             |   |
|----------------------------------|--|-----------|------------------------------------|--|-------------|---|
| <b>DC NOMINAL VOLTAGE</b>        |  | <b>24</b> | <b>TOTAL AC + DC LOAD from P.1</b> |  | <b>2975</b> | <b>Watt-hours/Day</b>                             |
| <b>EFFICIENCY / LOSS FACTORS</b> |  |           |                                    |  |             |   |
| <b>SOLAR PERIOD</b>              |  |           | Battery Average Efficiency         |  | 85%         | <b>Watt-Hours/Day</b><br><br>(100% if using MPPT) |
| Avg. Peak Sun Hrs/Day            |  | 5.0       | Inverter Average Efficiency        |  | 85%         |   |
| for design season                |  | YR        | Wiring & Distribution Efficiency   |  | 97%         |   |
| Solar Tracker Gain ?             |  | 0%        | <b>Energy to Be Generated</b>      |  | <b>4245</b> |   |
|                                  |  |           | PV loss factor                     |  | 85%         |   |
|                                  |  |           | PV:Battery mismatch factor         |  | 100%        |   |
|                                  |  |           | PV charge controller efficiency    |  | 97%         |   |
|                                  |  |           | <b>PV Array Required</b>           |  | <b>1030</b> | <b>Watts (peak rating)</b>                        |

|   |     |     |              |   |      |                      |
|---|-----|-----|--------------|---|------|----------------------|
| <b>PV ARRAY - MODULE SELECTION</b>                                  |     |     |              |   |      |                      |
| <b>ENTER HERE, AS 12V MODULES</b>                                   |     |     |              |   |      |                      |
| Full Array  | 12  | 90  | Watt modules | Total   | 1080 | Watts full array     |
| Proposed Array  | 12  | 90  | Watt modules | Total   | 1080 | Watts proposed array |
| To default back to Full Array, enter " =K16"                        |     |     |              |   |      |                      |
| <b>EQUIVALENT, WITH 24V MODULES</b>                                 |     |     |              |   |      |                      |
| Full Array  | 6   | 180 | Watt Modules | Some controllers accept nominal array voltage higher than system voltage. If doing, note: |      |                      |
| Proposed Array  | 6.0 | 180 | Watt Modules | Alternative Array V   |      |                      |
| Planning to use 24V modules? Enter 12V modules of half the wattage. |     |     |              | This will not effect calculation  |      |                      |

|   |    |                                    |                          |
|---|----|------------------------------------|--------------------------|
| <b>PV CHARGE CONTROLLER min. amp rating</b>   |    | <b>CHARGE CONTROLLER with MPPT</b> |                          |
| = full array current  | 32 | amps                               | with 25% boosted current |
| for proposed array  | 32 | amps                               | for proposed array       |
|   |    |                                    | 40                       |
|   |    |                                    | 40                       |
| MPPT = maximum power point tracking<br>It boosts current under favorable conditions |    |                                    |                          |

|   |   |  |            |
|---|---|--|------------|
| <b>BATTERY CAPACITY</b>   |   |  |            |
| Days of Energy Storage  | 2 | At Maximum Depth of Discharge  | 80%        |
| <b>CAUTION Battery capacity is small relative to the charge current. Increase Days of Energy Storage.</b> |   | Batt Capacity at Low-Temp  | 90%        |
|   |   | <b>Requires Battery Bank min.</b>  | <b>491</b> |
|   |   | For 2 parallel strings, each   | 246        |
|   |   | For 3 parallel strings, each   | 164        |
|   |   | For 4 parallel strings, each   | 123        |
|   |   | of 77°F standard rating<br><b>Amp-Hours</b><br>amp-hrs<br>amp-hrs<br>NOT RECOMMENDED |            |

|  |      |                                |                   |            |                      |                      |
|--|------|--------------------------------|-------------------|------------|----------------------|----------------------|
| <b>BACKUP CHARGER &amp; ENGINE-GENERATOR</b>   |      |                                |                   |            |                      |                      |
| Battery Charger Watts  | 1200 | 42                             | load Generator to | 50%        | 3000                 | Altitude, FEET       |
| Batt Charger Efficiency  | 80%  | amps                           |                   |            | 90%                  | Altitude Loss Factor |
| <b>Minimum Generator Rating</b>  |      |                                |                   | <b>3.4</b> | <b>Kilowatts</b>     |                      |
| <b>With proposed array,</b>  |      | <b>Est. Generator Run Time</b> |                   |            | <b>EXCESS ENERGY</b> |                      |
| Peak Sun Hrs/Day is  | 5.0  | will be                        | 0.0               | Hours/Week | 207                  | Watt-Hours/Day       |
|  | 7.5  |                                | 0.0               | Hours/Week | 2433                 | Watt-Hours/Day       |
|  | 6.0  |                                | 0.0               | Hours/Week | 1098                 | Watt-Hours/Day       |
|  | 4.0  |                                | 4.0               | Hours/Week | 0                    | Watt-Hours/Day       |
|  | 3.0  |                                | 9.2               | Hours/Week | 0                    | Watt-Hours/Day       |
| Ratio of Required Battery AH capacity to Batt. Charger Amps <b>12</b> If this ratio is less than 10 (in reality) charge amps will taper sooner than 80% full charge, and generator run time will be longer than shown above. |      |                                |                   |            |                      |                      |

Please refer to "INSTRUCTIONS & APPLICATION NOTES"  
a separate document

**ATTACHMENT 8**

**SYSTEM EVALUATION WORKSHEET**



**SOLAR AIR SPARGE SYSTEM  
EVALUATION WORKSHEET  
NAS CECIL FIELD; SITE 3**

PAGE 1 OF 6

**Sparge Curtain Pressure and Flow Checklist**

Date: \_\_\_\_\_  
Time: \_\_\_\_\_  
Field Personnel: \_\_\_\_\_

Ambient temp, weather, cloud cover: \_\_\_\_\_  
System operational on arrival?: \_\_\_\_\_  
System restarted on arrival?: \_\_\_\_\_

|   |  |
|---|--|
| Describe cause of shutdown if applicable: |  |
|---|--|

**System Pressures and Flows**

| Location           | Parameter          | Instrument Description (P&ID Symbol) | Open Solenoid Valve ID | Pressure Value <sup>(1)</sup> | Units | Calculated Injection Flow <sup>(2)</sup> (CFM) |
|--------------------|--------------------|--------------------------------------|------------------------|-------------------------------|-------|--|
| Equipment Module A | Discharge Pressure | Pressure Gauge (PG-A)                | SV-A1                  |                               | psi   |  |
| Equipment Module A | Discharge Pressure | Pressure Gauge (PG-A)                | SV-A2                  |                               | psi   |  |
| Equipment Module A | Discharge Pressure | Pressure Gauge (PG-A)                | SV-A3                  |                               | psi   |  |
| Equipment Module B | Discharge Pressure | Pressure Gauge (PG-B)                | SV-B1                  |                               | psi   |  |
| Equipment Module B | Discharge Pressure | Pressure Gauge (PG-B)                | SV-B2                  |                               | psi   |  |
| Equipment Module B | Discharge Pressure | Pressure Gauge (PG-B)                | SV-B3                  |                               | psi   |  |
| Equipment Module C | Discharge Pressure | Pressure Gauge (PG-C)                | SV-C1                  |                               | psi   |  |
| Equipment Module C | Discharge Pressure | Pressure Gauge (PG-C)                | SV-C2                  |                               | psi   |  |
| Equipment Module C | Discharge Pressure | Pressure Gauge (PG-C)                | SV-C3                  |                               | psi   |  |

*Based on flow-pressure compressor manufacturer test data (verified during system start up)*

(1) Pressure Value obtained from pressure gauges PG-A, PG-b, and PG-C

(2) Calculated Flow obtained by the following equation:  $\text{Flow} = (0.0351 \times \text{Pressure Value}) + 3.9832$

**SOLAR AIR SPARGE SYSTEM  
EVALUATION WORKSHEET  
NAS CECIL FIELD; SITE 3**

PAGE 2 OF 6

## Sparge Curtain Pulsing Settings and Runtime Checklist

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Field Personnel: \_\_\_\_\_

Ambient temp, weather, cloud cover: \_\_\_\_\_

System operational on arrival?: \_\_\_\_\_

System restarted on arrival?: \_\_\_\_\_

### Timers information

| Solenoid valve ID | Programmed <sup>(1)</sup> solenoid open time (minutes) | Actual <sup>(2)</sup> solenoid open time (minutes) | Hour Meter ID | Sparge well hour meter <sup>(3)</sup> (hours) |
|-------------------|--|--|---------------|---|
| SV-A1             |  |  | TR-A1         | ---   |
| SV-A2             |  |  | TR-A2         | ---   |
| SV-A3             |  |  | TR-A3         | ---   |
| na                | ---  | ---  | TR-A          |   |
| SV-B1             |  |  | TR-B1         | ---   |
| SV-B2             |  |  | TR-B2         | ---   |
| SV-B3             |  |  | TR-B3         | ---   |
| na                | ---  | ---  | TR-B          |   |
| SV-C1             |  |  | TR-C1         | ---   |
| SV-C2             |  |  | TR-C2         | ---   |
| SV-C3             |  |  | TR-C3         | ---   |
| na                | ---  | ---  | TR-C          |   |

(1) Programed solenoid open time obtained from programmable timers TR-A, TR-B and

(2) Actual solenoid open time obtained by calculation using hour meters readings,

(3) Sparge well hour meter readings obtained from direct read on the corresponding hour meter.

**SOLAR AIR SPARGE SYSTEM  
EVALUATION WORKSHEET  
NAS CECIL FIELD; SITE 3**

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**Sparge Curtain Solar Array Checklist**

Date: \_\_\_\_\_  
Time: \_\_\_\_\_  
Field Personnel: \_\_\_\_\_

Ambient temp, weather, cloud cover: \_\_\_\_\_  
System operational on arrival?: \_\_\_\_\_  
System restarted on arrival?: \_\_\_\_\_

**Solar Arrays parameters**

| Solar Array | Solar array timer daily run time setting (hours) | Charge controller elapsed runtime (hours) | Solar array set angle | Timer elapsed runtime (hours) |
|-------------|--|---|-----------------------|-------------------------------|
| A           |  |   |                       |                               |
| B           |  |   |                       |                               |
| C           |  |   |                       |                               |

**Optimum solar array settings for different months**

| Month     | Solar array angle (deg off horizontal) | Solar array timer daily run time <sup>1</sup> (hours) |
|-----------|--|---|
| June      | 6                                      | 9   |
| July      | 14                                     | 8.5   |
| August    | 22                                     | 8   |
| September | 30                                     | 7.5   |
| October   | 38                                     | 7   |
| November  | 46                                     | 6.5   |
| December  | 54                                     | 6   |
| January   | 46                                     | 6.5   |
| February  | 38                                     | 7   |
| March     | 30                                     | 7.5   |
| April     | 22                                     | 8   |
| May       | 14                                     | 8.5   |

<sup>1</sup> Shown for illustration assuming 9 hours in June and 6 hours in december daily run time

**SOLAR AIR SPARGE SYSTEM  
EVALUATION WORKSHEET  
NAS CECIL FIELD; SITE 3**

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**ROI Measurement Data**

Date: \_\_\_\_\_  
Time: \_\_\_\_\_  
Field Personnel: \_\_\_\_\_

| Monitoring Location ID | Description      | Field Parameters |           |          |              |          |               | Notes |
|------------------------|------------------|------------------|-----------|----------|--------------|----------|---------------|-------|
|                        |                  | DTW (feet)       | DO (mg/L) | ORP (mV) | Temp. (degF) | pH (ntu) | Cond. (μS/cm) |       |
| CEF-003-31S            | Monitoring Well  |                  |           |          |              |          |               |       |
| CEF-003-32D            | Monitoring Well  |                  |           |          |              |          |               |       |
| CEF-003-40S            | Monitoring Well  |                  |           |          |              |          |               |       |
| CEF-003-41S            | Monitoring Well  |                  |           |          |              |          |               |       |
| CEF-003-WP2            | Creek well point |                  |           |          |              |          |               |       |
| CEF-003-WP3            | Creek well point |                  |           |          |              |          |               |       |
| CEF-003-WP4            | Creek well point |                  |           |          |              |          |               |       |
| CEF-003-20S            | Monitoring Well  |                  |           |          |              |          |               |       |
| CEF-003-28S            | Monitoring Well  |                  |           |          |              |          |               |       |

Observations (bubbling; changes in conditions, etc):

Creek: \_\_\_\_\_  
Ground surface: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**SOLAR AIR SPARGE SYSTEM  
EVALUATION WORKSHEET  
NAS CECIL FIELD; SITE 3  
JACKSONVILLE, FLORIDA**

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**Compressor Manufacturer test data**

**Compressor Model: Thomas model: 2660CE37, 1/3hp, 115VAC**

| <i>Voltage<br/>(115VAC)</i> | <i>Pressure<br/>(psi)</i> | <i>Flow (CFM)</i> | <i>Current<br/>(Amps)</i> | <i>Power<br/>(Watts)</i> | <i>Speed<br/>(RPM)</i> |
|-----------------------------|---------------------------|-------------------|---------------------------|--------------------------|------------------------|
| 115                         | 6.3                       | 3.76              | 2.84                      | 278.6                    | 1746                   |
| 115                         | 10                        | 3.64              | 3.08                      | 312.1                    | 1735                   |
| 115                         | 15                        | 3.45              | 3.39                      | 353.6                    | 1721                   |
| 115                         | 20                        | 3.28              | 3.68                      | 390.1                    | 1708                   |
| 115                         | 25                        | 3.11              | 3.93                      | 421.4                    | 1696                   |
| 115                         | 30                        | 2.93              | 4.14                      | 446.4                    | 1686                   |

